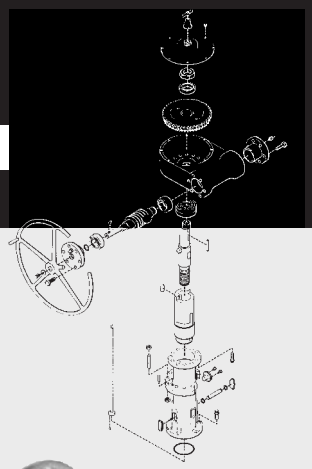
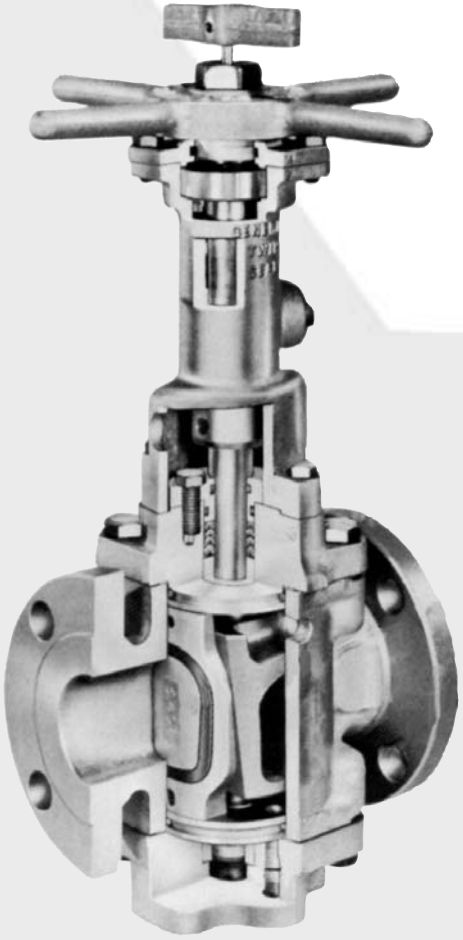
GENERAL TWIN SEAL™
Operation, Maintenance & Service Manual



SCOPE

Included in the following pages you will find assembly drawings, exploded views, parts lists, assembly tips, operational descriptions and routine maintenance requirements for the current design of the General Twin Seal™.



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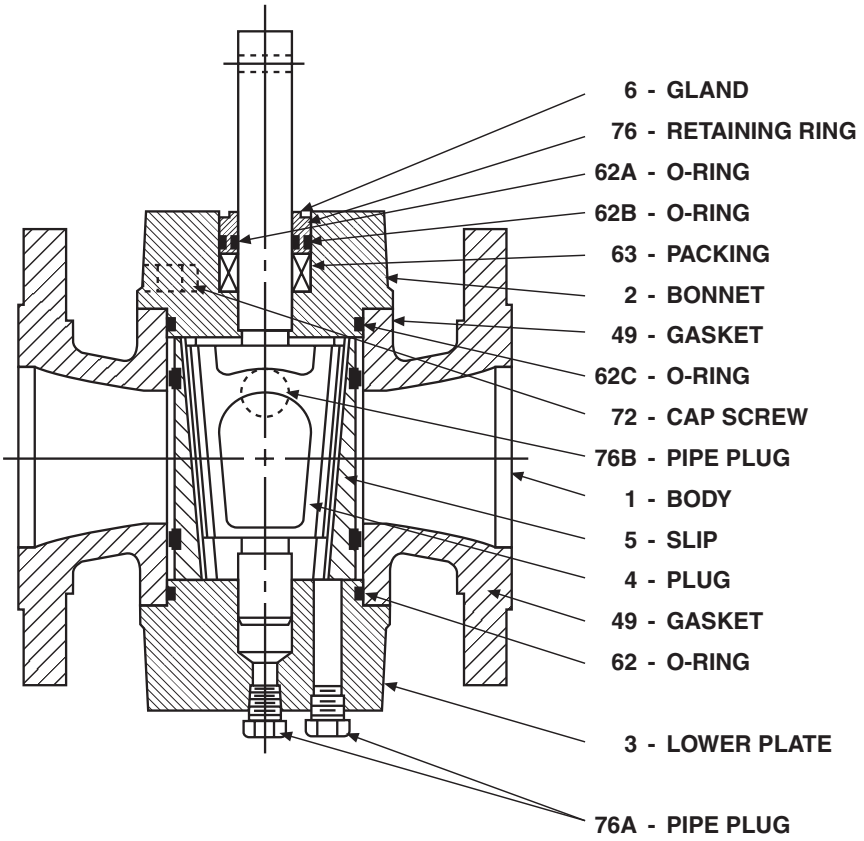
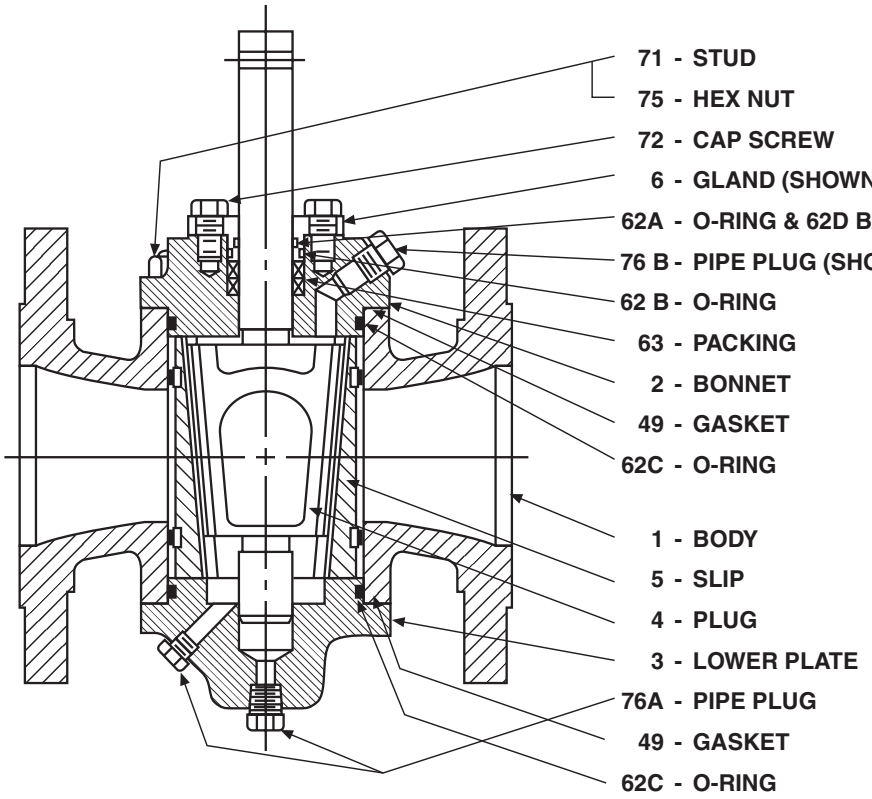
INTEGRAL BUSHING/RETAINING RING GLAND



Typical Arrangement of	
2"	C811
2"	C821
3"	CA811
3"	CA821

The smallest of the twin seal valves do not require discrete bushings due to minimal hydro seating forces within the valve. Also note that due to the size of the operator, the gland is held in by a retaining ring backed up by the operator housing.

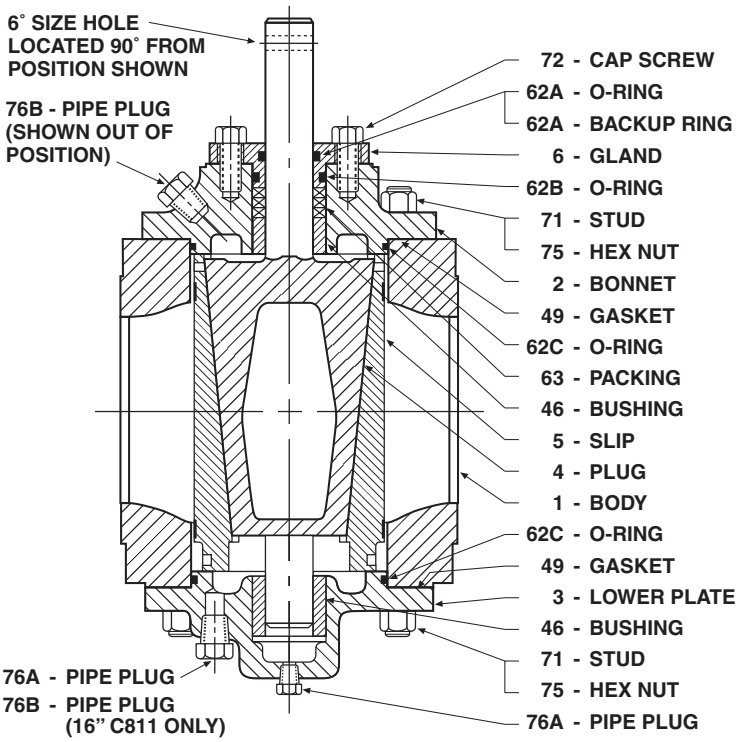
INTEGRAL BUSHING/BOLTED GLAND


71 - STUD
75 - HEX NUT
72 - CAP SCREW
6 - GLAND (SHOWN 90˚ OUT OF POSITION)
62A - O-RING & 62D BACKUP RING
76 B - PIPE PLUG (SHOWN 90˚ OUT OF POSITION)
62 B - O-RING
63 - PACKING
2 - BONNET
49 - GASKET
62C - O-RING
1 - BODY
5 - SLIP
4 - PLUG
3 - LOWER PLATE
76A - PIPE PLUG
49 - GASKET
62C - O-RING

Typical Arrangement of	
4"	C811

These units do not require discrete bushings due to small hydro seating forces, incorporating a slightly larger operator however, allows bolted glands to be employed.

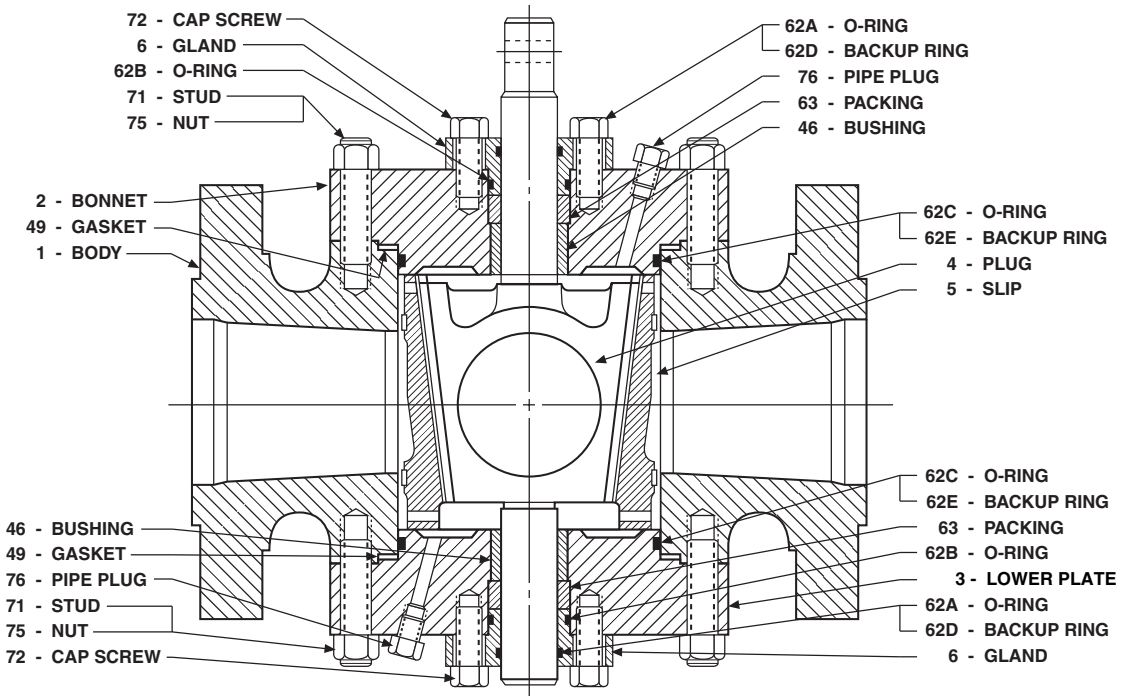
BUSHINGS/ONE GLAND



Typical Arrangement of					
1 1/2"	C921	6"	C911	12"	C811
2"	C841	6"	C921	12"	C821
2"	C851	6"	C941	12"	A1911
2"	C861	8"	C411	12"	C921
2"	C911	8"	C421	14"	C811
2"	C921	8"	C811	14"	C821
2"	C941	8"	C821	14"	C911
3"	C911	8"	C841	16"	C411
4"	C821	8"	C911	16"	C811
4"	C841	8"	C921	16"	C821
4"	C911	10"	C411	16"	C921
4"	C921	10"	C421	18"	C411
4"	C941	10"	CA811	18"	C811
6"	C411	10"	C821	20"	C411
6"	C421	10"	C911	20"	C421
6"	C821	10"	C921	20"	CA811
6"	C841	12"	C411	24"	C411
6"	CA811	12"	C421	24"	C421

This most popular General Twin Seal design employs bushings and requires a single gland.

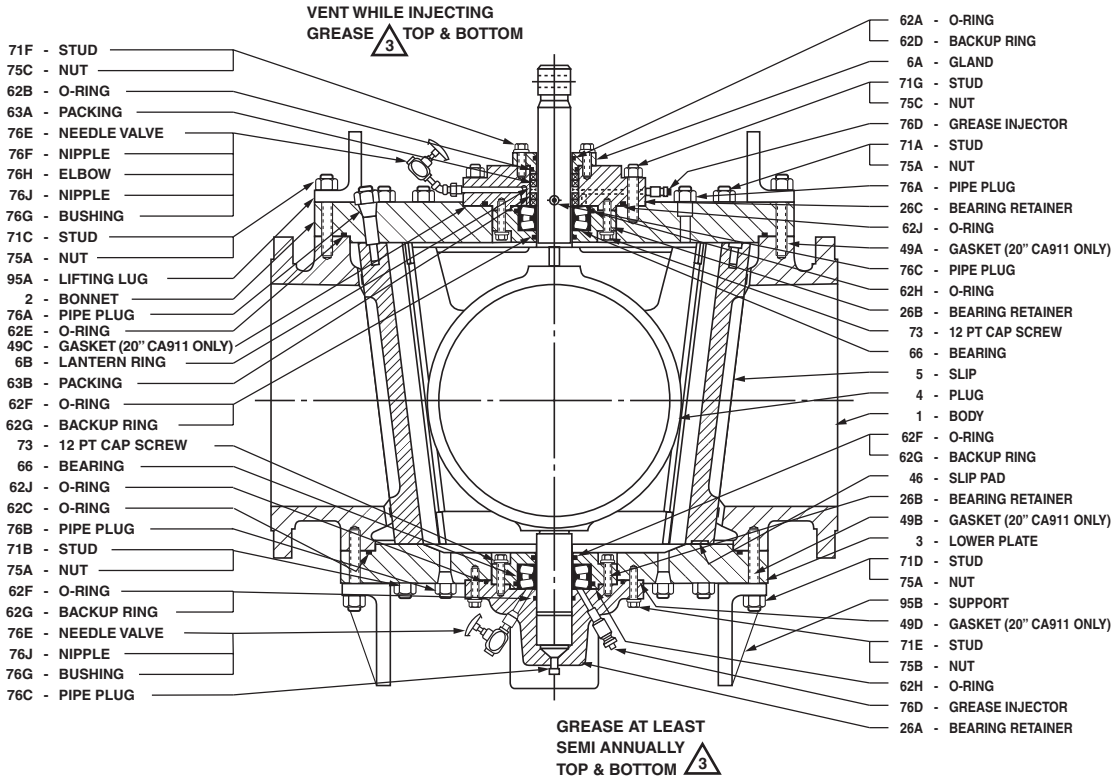
BUSHINGS/TWO GLANDS



Typical Arrangement of	
3"	C851
3"	C861
4"	C851
6"	C851

Higher pressure class valves employ the balanced plug design to minimize plug hydro forces which in turn requires two glands.

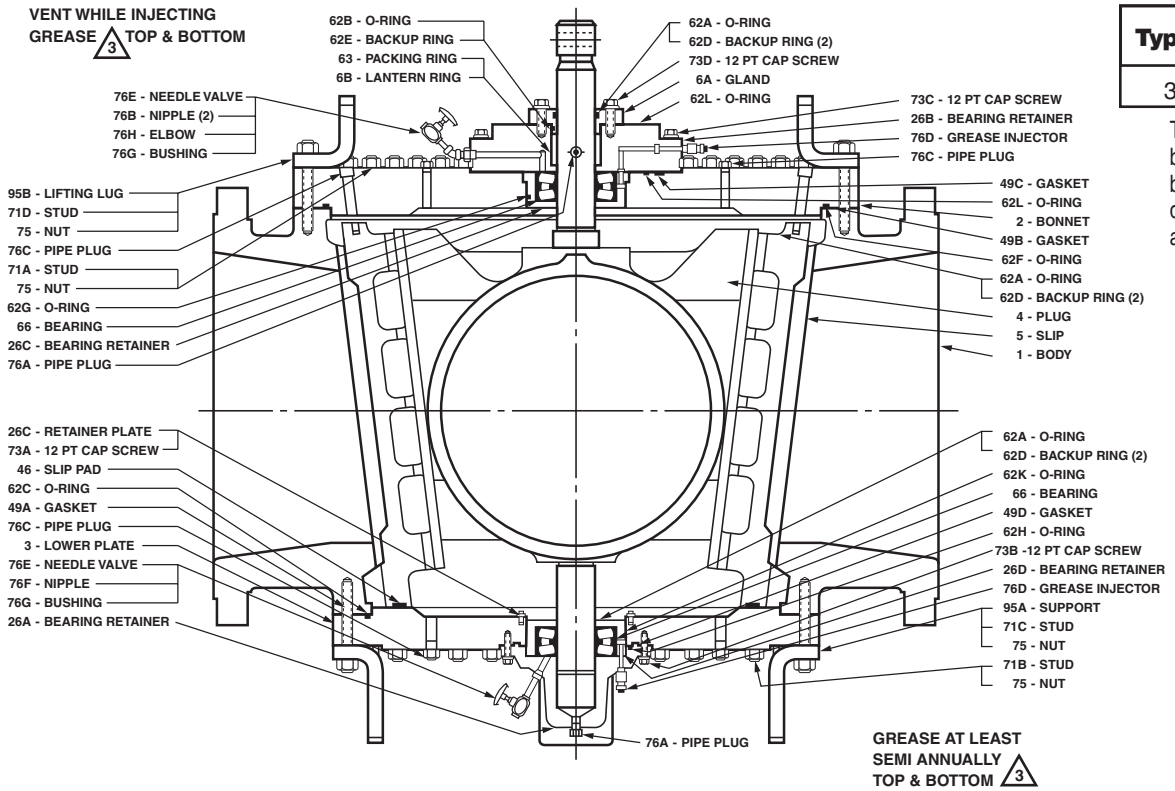
BEARINGS/DUAL RETENTION



Typical Arrangement of	
12"	C941
14"	C841
16"	C921
18"	CA821
20"	CA821
20"	CA841
20"	C841
20"	C911
20"	CA911
20"	CA921
24"	CA811
24"	C811
24"	C821
24"	CA821
28"	C811
30"	C821

As valve size increases so does the plug load, therefore, these sizes require bearings.

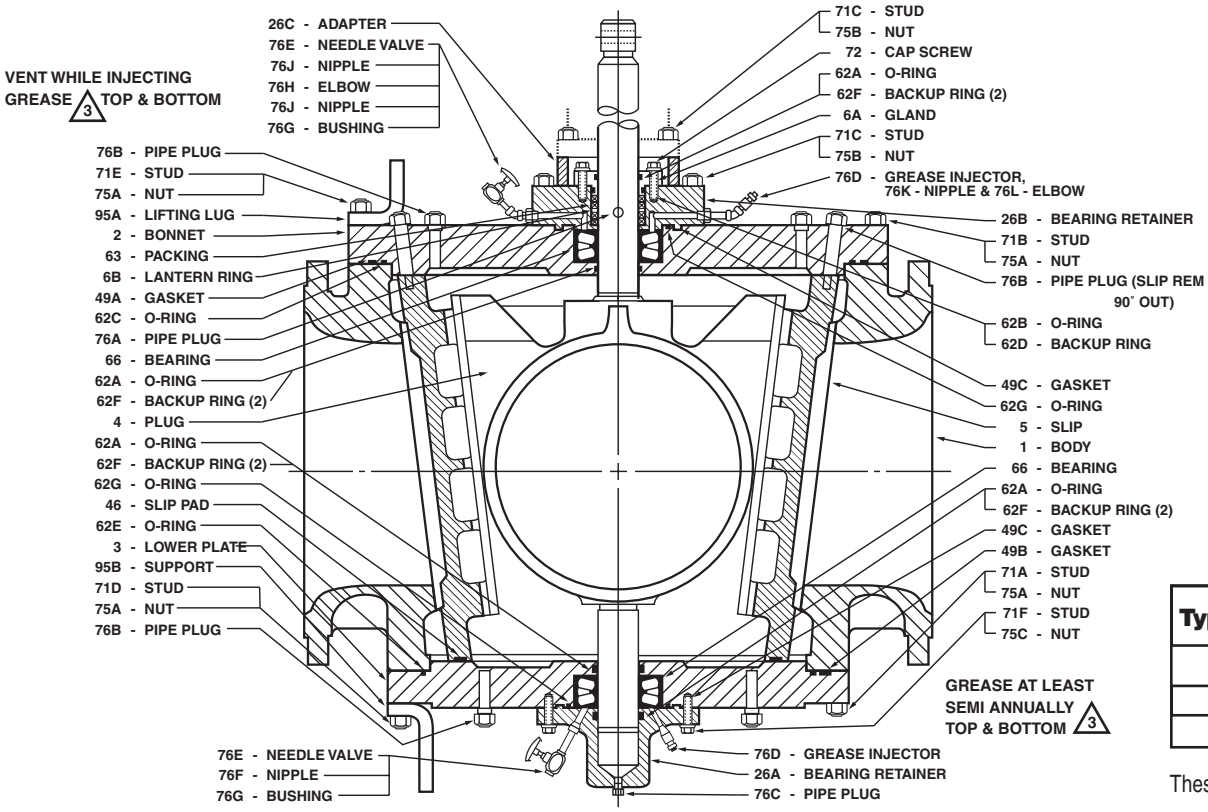
BEARINGS/DUAL RETENTION



Typical Arrangement of	
36"	CA811

This valve requires bearings. The inner bearing retainer is slightly different than the one above.

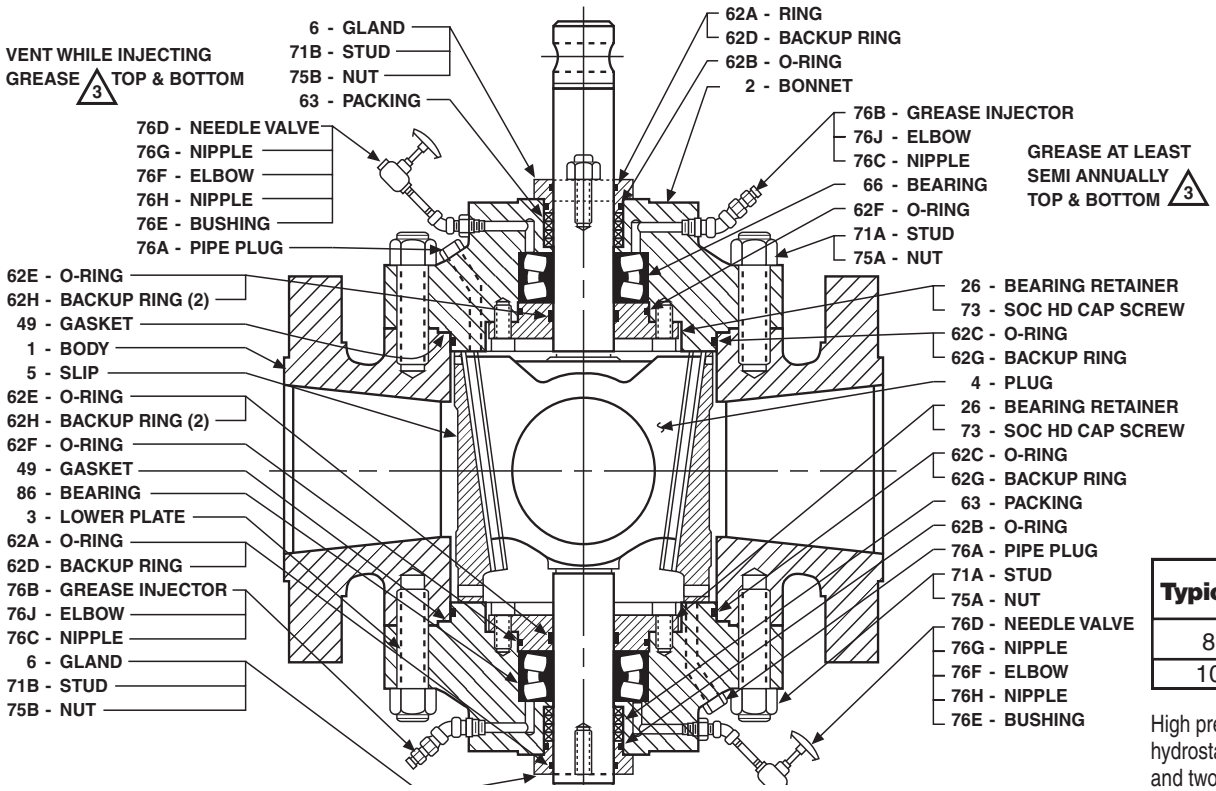
BEARINGS/INTERNALLY & EXTERNALLY RETAINED



Typical Arrangement of	
10"	CB841
10"	C941
12"	CB841

These valve sizes require bearings.

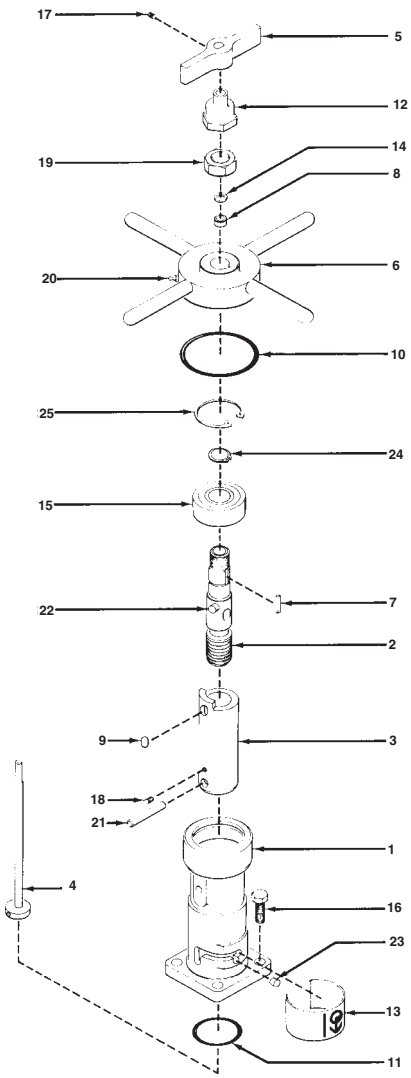
BEARINGS/INTERNALLY RETAINED W/TWO GLANDS



Typical Arrangement of	
8"	C851
10"	C851

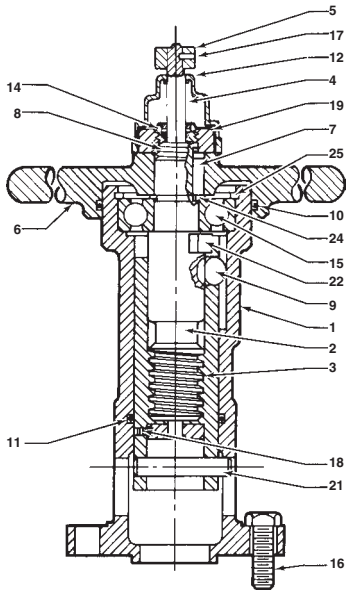
High pressures require hydrostatically balanced plugs and two glands.

Exploded View



Item No.	375 H Part No.	Description	Req'd
1	21-419	Operator Housing	1
2	22-417	Upper Stem	1
3	22-418	Lower Stem	1
4	27-418	Indicator Shaft	1
5	27-419	Indicator Flag	1
6	28-406	Handwheel	1
7	45-411	Key	1
8	46-425	Bushing	1
9	48-405	Roller	1
10	50-402	Grease Retainer	1
11	62-32	O-Ring	1
12	64-415	Protector	1
13	64-417	Insignia Plate	1
14	65-402	Grease Seal	1
15	66-409	Ball Bearing	1
16	72-5	Cap Screw	4
17	74-6	Screw	1
18	74-9	Set Screw	1
19	75-434	Nut	1
20	76-411	Lube Fitting	1
21	77-407	Guide Pin	1
22	77-423	Drive Pin *	1
23	77-453	Roll Pin	1
24	78-413	Retaining Ring	1
25	78-414	Retaining Ring	1

Cross Section



375 H Is Used on Models:	
2"	C811
2"	C821
3"	CA811
3"	CA821

OPERATOR DIS-ASSEMBLY

1. Unscrew (17) and remove indicator flag (5).
2. Remove the stem protector (12).
3. Remove the handwheel nut (19), handwheel (6), key (7) and grease retainer ring (10).
4. Remove the retainer ring (25) and pull out the upper stem (2) with lower stem (3), bearing (15), roller (9) and indicator shaft sub-assembly (4) out through the top of the housing (1).
5. Remove set-screw (18) from bottom of lower stem and push indicator shaft sub-assembly (4) out through the bottom of the lower stem.
6. Separate the stems and remove the retaining ring (24) and the bearing (15) from the upper stem.
7. Remove grease seal (14) and bushing (8) (if req'd) from top of upper stem (2).
8. Remove O-Ring (11) from inside of housing (1).

OPERATOR ASSEMBLY

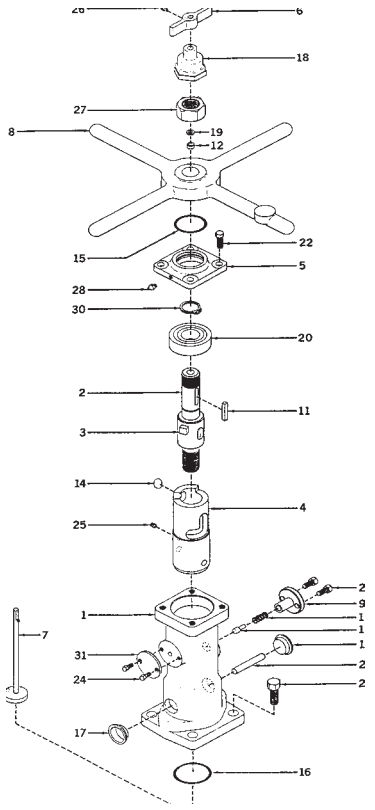
1. Install O-Ring (11) in housing (1).
2. Place the bearing (15) on the top of the upper stem (2). Install retaining ring (24).
3. Apply a liberal coating of grease to all surfaces of upper stem (2) and inside and outside of lower stem (3).
4. Thread the upper stem and lower stem together such that the drive pin (22) in the upper stem comes against the shoulder at the TOP of the lower stem (3) and the detent recess in the upper stem is exactly in line with roller opening in the lower stem.

   NOTE: This operation may require several attempts as the threads are multiple start and do not always assemble correctly with the first try.

5. Install the indicator shaft sub-assembly (4) up through both stems. Align the detent hole in the indicator disc with the threaded hole in the lower stem and fasten with set screw (18). Set screw must be below the outside surface of the lower stem.
6. Place the roller (9) in the side opening of the lower stem. A liberal application of grease will hold the roller in position.
7. Place the stem assembly into the housing taking care that roller is aligned with roller groove in housing. Push the entire assembly down until the bearing rests on the shoulder in the housing.
8. Install the retaining ring (25) in the top of the housing (1).
9. Install grease retainer (10) in handwheel (6) and place handwheel and key (7) on upper stem. Install bushing (8) and grease seal (14) in handwheel nut (19). Screw the nut on the upper stem and tighten down on handwheel securely.
10. Install stem protector (12).
11. Install indicator flag (5) and secure with screw (17).

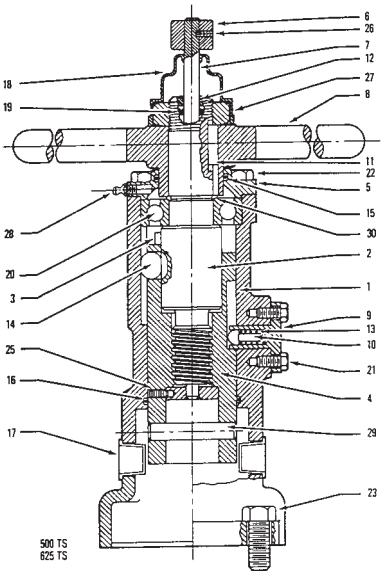
* not available separately

Exploded View



Item No.	500 H Part No.	625 H Part No.	Description
1	21-411	21-407	Operator Housing
2	22-408	22-411	Upper Stem
3	41-405	41-406	Drive Pin *
4	22-409	22-413	Lower Stem
5	26-408	26-405	Housing Cap
6	27-406	27-406	Indicator Flag
7	27-404	27-438	Indicator Shaft
8	28-409	28-401	Handwheel
9	41-403	41-403	Guide Pin
10	41-404	41-404	Detent Pin
11	45-401	45-413	Key
12	46-424	46-424	Bushing
13	47-401	47-401	Spring
14	48-401	48-403	Roller
15	62-17	62-17	O-Ring
16	62-18	62-22	O-Ring
17	64-414	64-405	Plastic Plug
18	64-411	64-412	Protector
19	65-401	65-401	Grease Seal
20	66-402	66-403	Ball Bearing
21	72-4	72-4	Cap Screw
22	72-5	72-6	Cap Screw
23	72-6	72-11	Cap Screw
24	72-21	72-21	Cap Screw
25	74-1	74-3	Set Screw
26	73-28	74-6	Screw
27	75-427	75-429	Hex Nut
28	76-411	76-411	Lube Fitting
29	77-402	77-403	Coupling Pin
30	78-403	78-404	Retaining Ring
31	93-413	93-413	Cover

Cross Section



625 H Is Used on Models:			
2"	C851	2"	C941
2"	C861	4"	C941
3"	C851	6"	C911
3"	C861	6"	C921
4"	C841		
4"	C851		
6"	C821		
8"	C811		
10"	CA811		

500 H Is Used on Models:			
2"	C841	2"	C921
3"	C841	3"	C911
4"	C811	4"	C911
4"	C821	4"	C921
6"	CA811		

OPERATOR DIS-ASSEMBLY

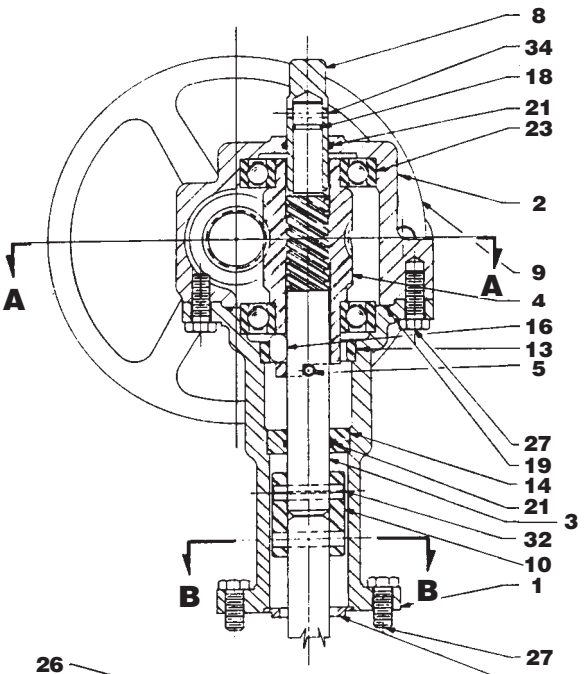
1. Unscrew (26) and remove indicator flag (6).
2. Remove the stem protector (18).
3. Remove bearing retainer nut (27).
4. Remove the handwheel (8) and key (11).
5. Unbolt and remove the housing cover (5).
6. Unbolt and remove the guide pin (9), with detent pin (10) and spring (13).
7. Pull the upper stem (2) with lower stem (4), roller (14), bearing (20) and indicator shaft (7) out through the top of the housing (1). If the bearing is snug in the housing, replace the handwheel and key. Turn the handwheel clockwise to raise the lower stem as far as possible. Insert a 3/8" diameter bar through the two holes in the bottom of the housing. Turn the handwheel clockwise and jack the bearing clear of the housing.
8. Remove the set-screw (16) and push the indicator shaft sub-assembly (7) out through the bottom of the lower stem.
9. Remove the lower stem (4) from the upper stem (2).
10. Remove the retaining ring (30) and bearing (20) from the upper stem.
11. Remove the O-Ring (16) from the inside of the housing, and grease seal (19) and bushing (12) (if req'd) from the top of the upper stem (2).

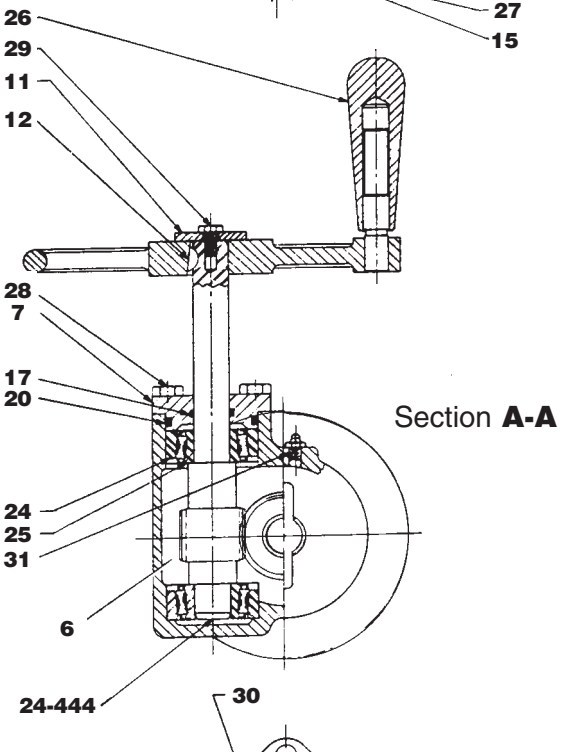
OPERATOR ASSEMBLY

1. Place the bearing (20) on upper stem (2). Install a retaining ring (30) to lock bearing in place.
2. Apply a liberal coat of grease to all surfaces of upper stem (2) below the bearing, and to all surfaces of the lower stem (4). Thread the upper stem (2) into the lower stem (4) such that the drive pin (3) in the upper stem comes against the shoulder at the TOP of the lower stem and the detent recess in upper stem is exactly in line with the roller opening in lower stem. This operation may require several attempts as the threads are multiple start and do not always assemble correctly with the first try.
3. Install the indicator shaft assembly (7) up through both stems. Align the detent hole in the indicator disc with the threaded hole in the lower stem and fasten with set-screw (25). Set-screw must be below the outside surface of the lower stem.
4. Install O-Ring (16) in housing (1).
5. Place roller (14) in opening of lower stem. A liberal application of grease will hold it in position.
6. Place the stem assembly into the housing – taking care that roller is aligned with roller groove in housing. Push entire assembly down until bearing rest on shoulder in housing.
7. Apply a smooth even coating of Permatex Number 3D to surface of guide pin boss on housing (1).
8. Insert guide pin (14) with detent pin (10) and spring (13) to fully engage slot in lower stem and secure with cap screws (21).
9. Apply a smooth even coating of Permatex Number 3D to top surface of housing (1).
10. Install O-Ring (15) in housing cover (5) and secure to housing (1) with cap screws (22).
11. Install the handwheel (8) and key (11).
12. Install the bearing retainer nut (27) and tighten securely.
13. Install grease seal (19) and bushing (12) in top of upper stem (2).
14. Install stem protector (18).
15. Install indicator flag (6) and secure with screw (26).

* not available separately

Cross Section



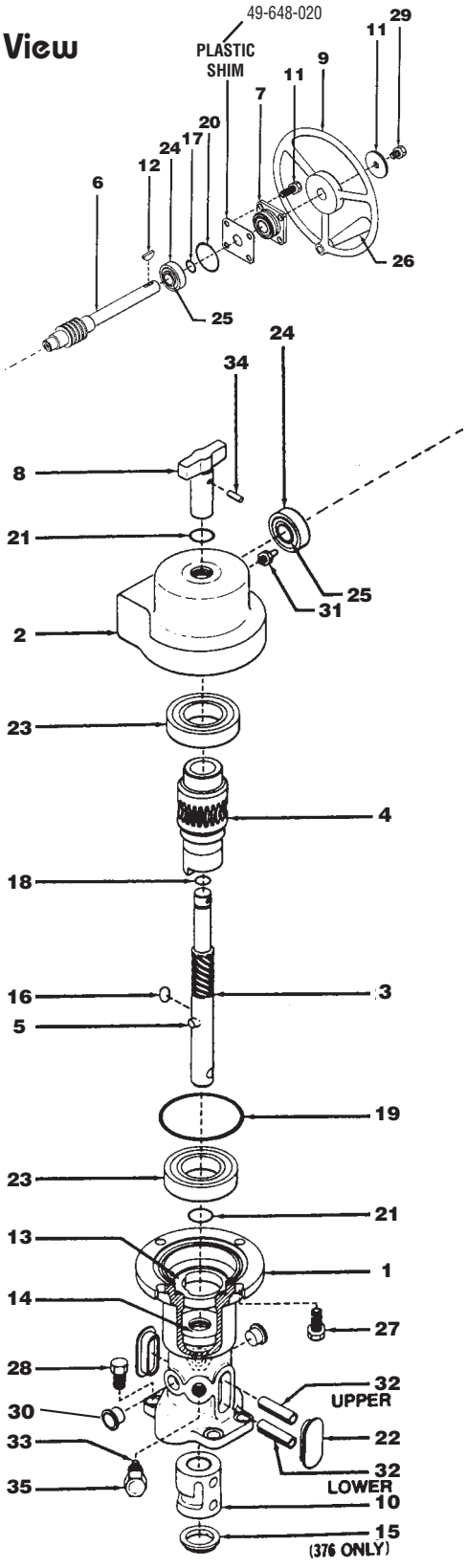


Section **A-A**

Section **B-B**

376 G Is Used on Models:			
2"	C811	2"	C821
3"	CA811	3"	CA821

Exploded View



501 G Is Used on Models:			
2"	C841	2"	C921
3"	C841	3"	C911
4"	C811	4"	C911
4"	C821	4"	C921
6"	CA811		

OPERATOR DIS-ASSEMBLY

1. Remove the indicator pin (34) and pull the indicator stem (8) up through the gear housing (2).
2. Remove the stop screw (35) and dowel pin (33). Drive out the upper coupling pin (32) and remove the coupling (10).
3. Remove the cap screw (29), washer (11), handwheel (9) and key (12).
4. Remove the four cap screws (27) and the gear housing cover (7).
5. Remove four cap screws (27) and lift off the gear housing (2). It may be necessary to turn the worm shaft counterclockwise to back the worm clear of the gear while lifting off the gear housing. The worm shaft (6) and the tapered bearing cup (24) and cone (25) on each end may now be removed from the gear housing (2).
6. The operator stem (3), upper stem (4), bearings (23), and roller (16) may now be lifted out of the operator housing.

NOTE: The cam bushing (13) and stem bushing (14) are a press fit in the operator housing and should not be removed. Should the cam bushing require replacement, the operator housing must be returned to the factory.

Item No.	376G Part No.	501G Part No.	Description	Req'd
1	21-583	21-555	Operator Housing	1
2	21-584	21-554	Gear Housing	1
3	22-524	22-508	Operator Stem	1
4	23-560	23-525	Upper Stem	1
5	77-465	77-464	Pin*	1
6	24-451	24-445	Worm Shaft	1
7	26-632	26-580	Gear Housing Cover	1
8	27-545	27-504	Stem Indicator	1
9	28-441	28-442	Handwheel	1
10	32-476	32-469	Coupling	1
11	44-465	44-453	Handwheel Washer	1
12	45-431	45-431	Key	1
13	46-557	46-501	Cam Bushing	1
14	46-558	46-502	Stem Bushing	1
15	46-559	—	Pilot Bushing	1
16	48-405	48-401	Roller	1
17	62-71	62-34	O-Ring	1
18	62-83	62-70	O-Ring	1
19	62-398	62-79	O-Ring	1
20	62-91	62-91	O-Ring	1
21	62-371	62-339	O-Ring	2
22	—	64-424	Caplug	
23	66-483	66-476	Ball Bearing	2
24	66-481	66-477	Cup Bearing	2
25	66-482	66-478	Cone Bearing	2
26	69-414	69-414	Spinner Handle	1
27	72-5	72-5	Cap Screw	8
28	72-16	72-10	Cap Screw	4
29	72-21	72-26	Cap Screw	1
30	76-891	76-594	Plug	1
31	76-612	76-612	Lube Fitting	1
32	77-422	77-417	Coupling Pin	2
33	77-480	77-418	Dowel Pin	1
34	77-451	77-440	Indicator Pin	1
35	98-790	98-663	Stop Screw	1

OPERATOR ASSEMBLY

1. Install O-Ring (21) in the stem bushing (14) in the Operator Housing (1). Place bearing (23) in the top of the operator housing (1).
2. Apply a liberal coating of grease to all surfaces of the operator stem (3) and the upper stem (4). Thread the operator stem into the upper stem such that the dowel pin (5) comes against the shoulder at the BOTTOM of the upper stem and the detent recess in the operator stem is exactly in line with the roller opening at the bottom of the upper stem. This operation may require several attempts as the threads are multiple start and do not always assemble correctly with the first try.
3. Place the roller (16) in the opening of the upper stem (4) and the detent recess of the operator stem (3). An application of grease will hold it in position.
4. Position the operator housing such that when viewed from above, the raised portion of the cam is in the lower left quadrant of the housing bore (see cross-section illustration). With the roller on the left side, place the upper stem, operator stem and roller (which have been assembled together–see steps 2 & 3) into the operator housing (1), down through the stem bushing (14) and cam roller bushing (13) until the shoulder of the upper stem (4) is against the bearing (23).
5. Install bearing (23) in the gear housing (2). Install the O-Ring (21) in the top of the gear housing (2).
6. Install the tapered roller bearing cup (24) in the recess of the gear housing with the large diameter of the taper facing out.
7. Install tapered roller bearing cup (24) and cone (25) on the handwheel end of the worm shaft (6). Place bearing cone (25) on the opposite end of the worm shaft with the large diameter of the taper against the shaft shoulder. Apply a liberal amount of grease to all parts.
8. Install the worm shaft in the gear housing. Make certain that the rear bearing cone has properly entered the rear bearing cup.
9. Install O-Rings (17) and (20) in the gear housing cover (7) and assemble to the gear housing (2) with four of the cap screws (27). Run the screws in just enough to keep parts in place but do not tighten at this time.
10. Install O-Ring (19) in the top of the operator housing. Place the gear housing on the operator housing with the worm gear on the left side as viewed from the top (same side as the roller) and fasten with four of the cap screws (27).

    NOTE: Worm shaft must be moved out slightly to allow parts to assemble. Tighten cap screws (27) in gear housing cover (7).

11. Assemble handwheel (9), key (12), washer (11) and cap screw (29) on the worm shaft.
12. Place a drift punch through the hole in the top of the operator stem to prevent it from turning. With the punch at 90° to the worm shaft, turn the handwheel clockwise and run the upper stem down as far as it will go. Place the coupling (10) on the bottom of the operator stem with the horizontal portion of the L-shaped groove at the bottom. Turn the coupling until the coupling pin hole in the operator stem is aligned with the top hole in the coupling, and the vertical groove without the ramp is aligned with the stop screw boss in the housing. Drive the coupling (32) into the hole in the top of the coupling and the bottom hole of the operator stem. Install the stop screw (35) and the dowel pin (33).

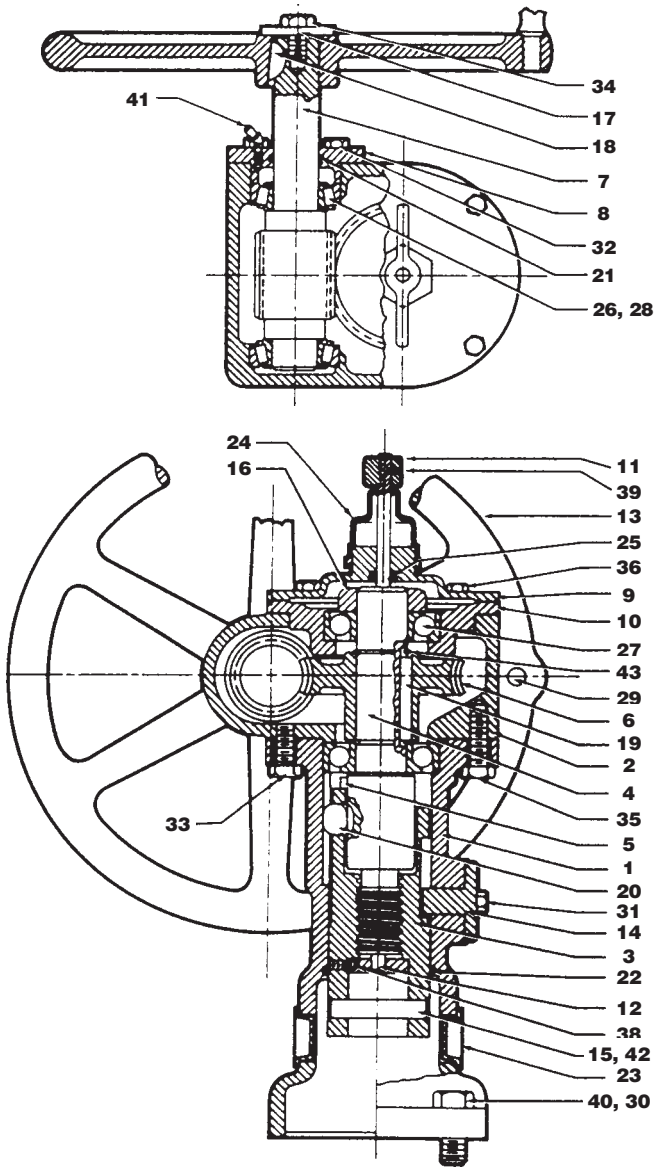
    NOTE: The coupling (10) has an L-shaped groove on both sides. The vertical portion of one of the grooves has a ramp at the top. The coupling must be installed such that the side without the ramp is adjacent to, and engages the stop screw. (The ramp is used to actuate the automatic body bleed valve when installed.)

13. Install O-Ring (21) in the top of the gear housing and O-Ring (18) in the top of the lower stem (3). Place the indicator stem (8) on the top of the operator stem and down through the gear housing. Install the indicator pin (34).

* not available separately

TWIN SEAL™ MODEL 625G, 751G & 755G

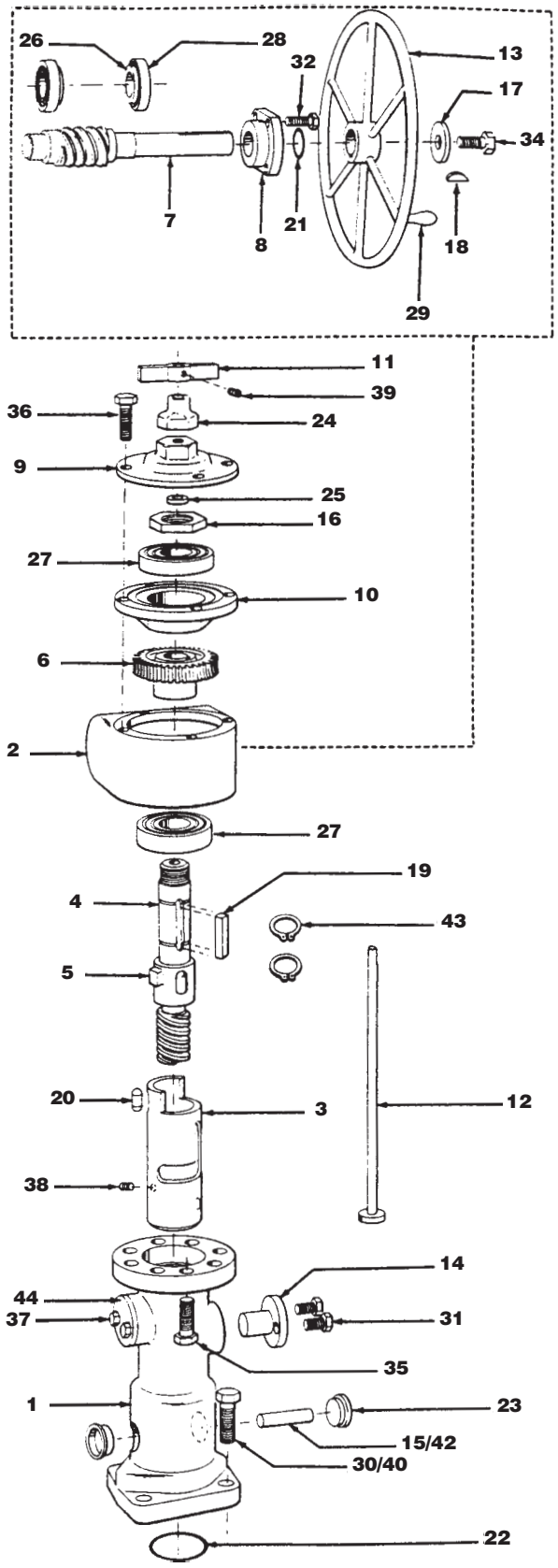
Cross Section



625 G Is Used on Models:			
2"	C851	2"	C941
2"	C861	4"	C941
3"	C851	6"	C911
3"	C861	6"	C921
4"	C841		
4"	C851		
6"	C821		
8"	C811		
10"	CA811		

751 G Is Used on Models:			
6"	C841	8"	C911
8"	C821	10"	C911
10"	C821		
12"	C811		
14"	C811		

Exploded View



755 G Is Used on Models:			
6"	C851	6"	C941
8"	CA841		

OPERATOR DIS-ASSEMBLY

1. Unscrew (39) and remove indicator flag (11).
2. Remove Stem protector (24).
3. Unbolt and remove gear housing cover (9).
4. Remove bearing retainer nut (16).
5. Remove bearing carrier (10) and upper bearing (27).
6. Remove upper retaining ring (43).
7. Remove cap screw (34), washer (17), handwheel (13) and key (18).
8. Unbolt and remove bearing cap (8).
   CAUTION: DO NOT DAMAGE PLASTIC SHIMS.
9. Screw out the worm shaft (7). Front bearing cone (26) and cup (28) and rear bearing cone (26) will come out with the worm shaft. Rear bearing cup (28) can then be removed from gear housing (2).
10. Remove the worm gear (6) and key (19).
11. Unbolt and remove the gear housing (2).
12. Unbolt and remove the guide pin (14).
13. Pull the upper stem (4) with lower stem (3), roller (20), lower bearing (27) and indicator shaft (12) out through the top of the housing (1). If the bearing is snug in the housing, install the worm gear with its key on the upper stem upside down (hub up). Turn the gear counter clockwise to raise the lower stem as far as possible. Insert a 1/2" diameter bar through the two holes in the bottom of the housing. Using a pipe wrench on the gear hub, turn clockwise and jack the bearing clear of the housing.
14. Remove the set-screw (38) and push the indicator shaft sub-assembly (12) out through the bottom of the lower stem.
15. Remove the lower stem (3) from the upper stem (4).
16. Remove the retaining ring (43) and lower bearing (27) from the upper stem.

OPERATOR ASSEMBLY

1. Place one of the two bearings (27) on upper stem (4).
   NOTE: This bearing is assembled such that the wide surface of the inner race seats on the upper stem shoulder.
   Install a retaining ring (43) to lock the bearing in place.
   NOTE: The retaining ring comes against narrow surface of inner race.
2. Apply liberal coat of grease to all surfaces of the upper stem below the bearing. Thread the upper stem (4) into the lower stem (3) such that stop pin (5) in the upper stem comes against the shoulder at the TOP of the lower stem and the detent recess in upper stem is exactly in line with the roller opening in lower stem. This operation may require several attempts as the threads are multiple start and do not always assemble correctly with the first try.
3. Install the indicator shaft assembly (12) up through both stems. Align the detent hole in the indicator disc with the threaded hole in the lower stem and fasten with set-screw (38). Set-screw must be below the outside surface of the lower stem.
4. Install O-Ring (22) in housing (1).
5. Place roller (20) in opening of lower stem. A liberal application of grease will hold it in position.
6. Place the stem assembly into the housing–taking care that roller is aligned with roller groove in housing. Push entire assembly down until bearing rests on shoulder in housing.
7. Apply a smooth even coating of Permatex Form-a-Gasket to surface of guide pin boss on housing (1).
8. Insert guide pin (14) to full engage slot in lower stem and secure with cap screws (31).
9. Place gear key (19) in key way of upper stem.
10. Install tapered roller bearing cup (28) in rear bearing recess of gear housing (2) with large diameter of taper facing out.
11. Install tapered roller bearing cup (28) and cone (26) on handwheel end of worm shaft (7). Place bearing cone (26) on opposite end with large diameter of taper against shaft shoulder.
12. Install worm shaft in gear housing. Make certain that rear bearing cone has properly entered rear bearing cup (28).
13. Install O-Ring (21) in bearing cap (8).
14. Apply a smooth even coating of Permatex Number 3D to bearing cover boss on gear housing. Fasten bearing cap (8) in place with cap-screws (32). Be sure to install the plastic shims between gear housing and bearing cap.
15. Install worm gear (6) in gear housing with hub down. (Toward smaller opening).
16. Apply Form-A-Gasket to top flange of operator housing (1). Place gear housing (2) with assembled parts on top of operator housing guiding worm gear keyway over key (19) in upper stem (3).
17. Install retaining ring (43) to secure worm gear (6).
18. Fasten gear housing (2) to operator housing (1) with cap screws (35). CAUTION: NOTE THAT THE SHORT CAP SCREW (33) IS INSTALLED DIRECTLY UNDER THE CENTER OF THE WORM SHAFT (7).
19. Fill gear housing (2) with grease up to top of worm gear.
20. Install bearing (27) in bearing carrier (10). NOTE: The widest surface of the outer race goes against the shoulder in the bearing carrier.
21. Apply a smooth even coating of Form-A-Gasket over top surface of gear housing (2).
22. Place bearing carrier (10) on top of gear housing (2). Install two cap screws (36) 180° apart to temporarily align the bearing carrier. They need only be partially screwed in.
23. Install lock nut (16) on upper stem and tighten snug with a wrench. Remove the two cap screws (36).
24. Install the grease seal (25) in the gear housing cover (9). Slide the cover over the indicator shaft (12) and secure to top of gear housing (2) with cap screws(36).
25. Install stem protector (24).
26. Install indicator (11) and secure with socket head cap screw (39).

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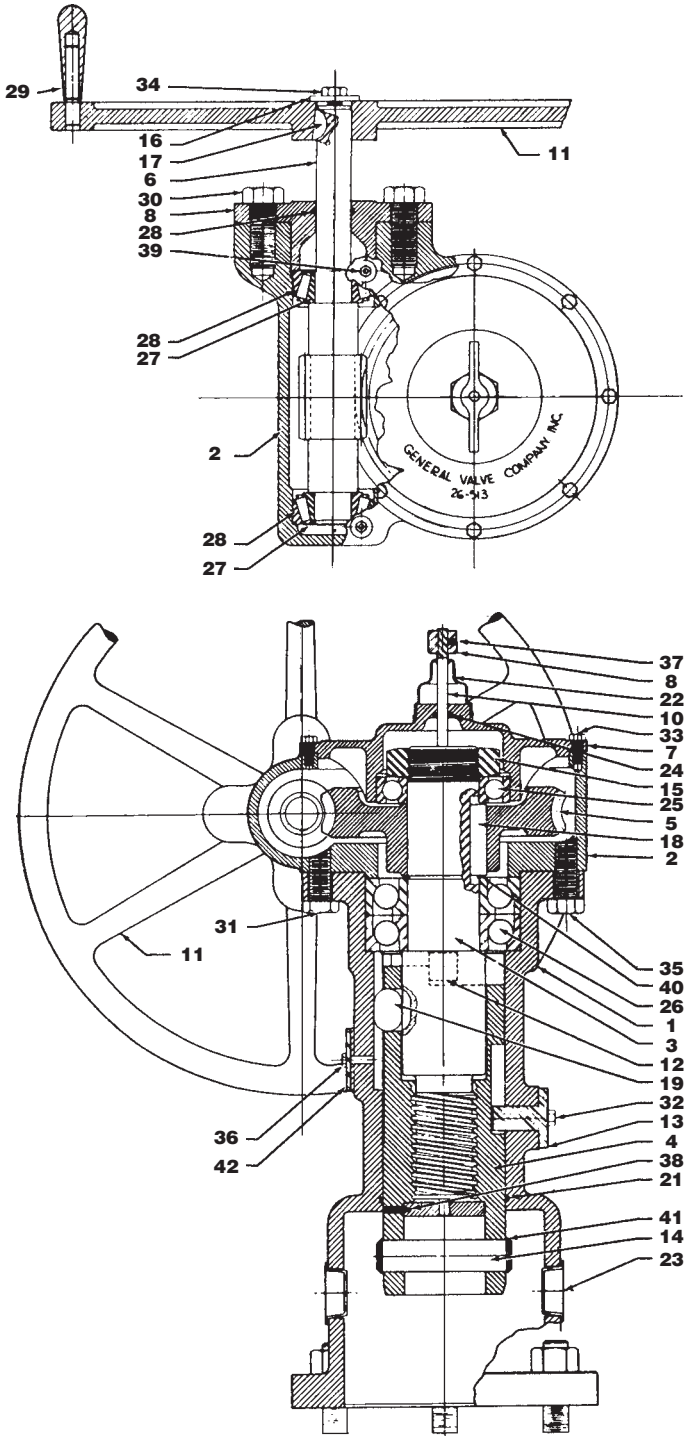
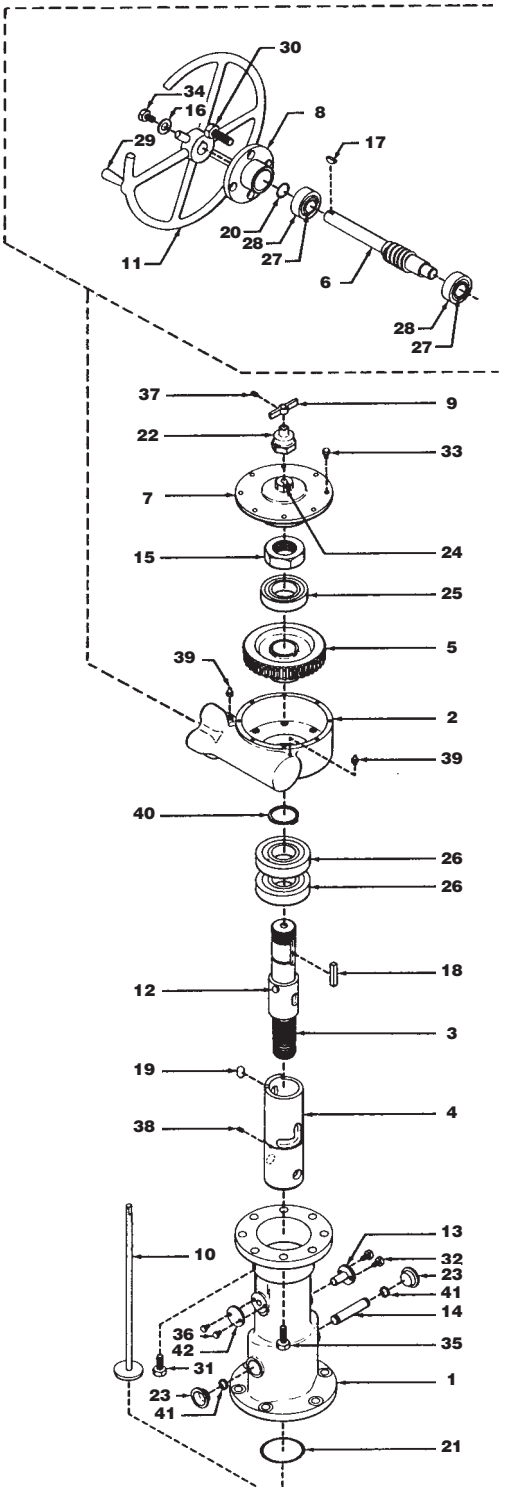
Item No.	625 G Part No.	751 G Part No.	755 G Part No.	Description
1	21-422	21-623	21-623	Housing Operator
2	21-408	21-405	21-443	HSG Gear
3	22-440	22-555	22-555	Stem Lower
4	22-439	22-554	22-554	Stem Upper
5	41-406	41-401	41-401	Pin Drive *
6	23-402	23-403	23-406	Gear Worm
7	24-404	24-404	24-403	Shaft Worm
8	26-401	26-401	26-401	Cap Bearing
9	26-413	26-403	26-403	Cover Gear Housing
10	26-412	26-411	26-423	Carrier Bearing
11	27-406	27-406	27-406	Indicator Flag
12	27-429	27-435	27-435	Indicator Shaft
13	28-404	28-402	28-402	Handwheel
14	41-407	41-498	41-498	Pin Guide
15	77-403	41-410	41-410	Pin Coupling
16	75-462	42-401	42-401	Nut Hex
17	44-401	44-401	44-401	Washer
18	45-402	45-402	45-402	Key Woodruff
19	45-403	45-406	45-406	Key Straight
20	48-403	48-413	48-413	Roller
21	62-13	62-13	62-13	O-Ring
22	62-22	62-209	62-209	O-Ring
23	64-405	64-402	64-402	Plastic Plug
24	64-411	64-411	64-411	Protector
25	65-401	65-401	65-401	Seal Grease
26	66-401	66-401	66-401	Bearing Cone
27	66-412	66-410	66-410	Bearing Ball
28	66-458	66-458	66-458	Bearing Cup
29	69-414	69-414	69-414	Handle Spinner
30	72-11	——	——	Stud
31	72-4	72-4	72-4	Screw Cap
32	72-5	72-5	72-5	Screw Cap
33	72-10	72-6	——	Screw Cap
34	72-8	72-8	72-8	Screw Cap
35	72-9	72-9	72-9	Screw Cap
36	72-14	72-14	72-26	Screw Cap
37	72-21	72-21	72-21	Screw Cap
38	74-3	74-4	73-28	Screw Set
39	74-6	74-6	74-6	Screw
40	——	73-130	73-130	Nut Hex
41	76-612	76-612	76-612	Fitting Lube
42	——	78-406	78-406	Ring Retaining
43	78-404	78-408	78-408	Ring Retaining
44	93-413	93-413	93-413	Cover

not available separately

Cross Section



Exploded View



1261 G Is Used on Models:			
12"	C821	8"	C921
14"	C821	10"	CA921
16"	C811	12"	CA911
18"	C811	14"	C911
20"	CA811	16"	C911

43 NOT SHOWN

1261-7G Is Used on Models:			
8"	C851	12"	CA921
10"	CB841	18"	C911
12"	CB841	20"	CA911
16"	CA821		
18"	CA821		
24"	CA811		

OPERATOR DIS-ASSEMBLY

1. Unscrew (37) and remove indicator flag (9).
2. Remove indicator shaft protector (22).
3. Unbolt and remove gear housing cover (7).
4. Remove upper stem nut (15).
5. Remove upper bearing (25).
6. Remove cap screw (34), handwheel washer (16), handwheel (11) and woodruff key (17).
7. Unbolt and remove bearing cap (8). ***CAUTION: DO NOT DAMAGE PLASTIC SHIMS.***
8. Screw out worm shaft (6). Front bearing cone (27) and cup (28) and rear bearing cone (27) will come out with the worm shaft. Rear bearing cup (28) can then be removed from gear housing.
9. Remove the worm gear (5) and key (18).
10. Unbolt and remove the gear housing (2).
11. Remove the retaining ring (40).
12. Unbolt and remove the guide pin (13).
13. Pull the upper stem (3) with the lower stem (4), roller (19), two bearings (26) and indicator shaft (10) out through the top of the housing (1). If the bearings are snug in the housing, install the worm gear (5) with its key (18) on the upper stem upside down (hub up). Turn the gear counter-clockwise to raise the lower stem as far as possible. Insert a 1 1/2" diameter bar through the two holes in the bottom of the housing. Using a pipe wrench on the gear hub, turn clockwise and jack the bearing clear of the housing.
14. Remove the socket head cap screw (38) and push the indicator shaft sub-assembly (10) out through the bottom on the lower stem (4).
15. Remove the lower stem (4) from the upper stem (3).
16. Remove the bearings (26) from the upper stem (3).

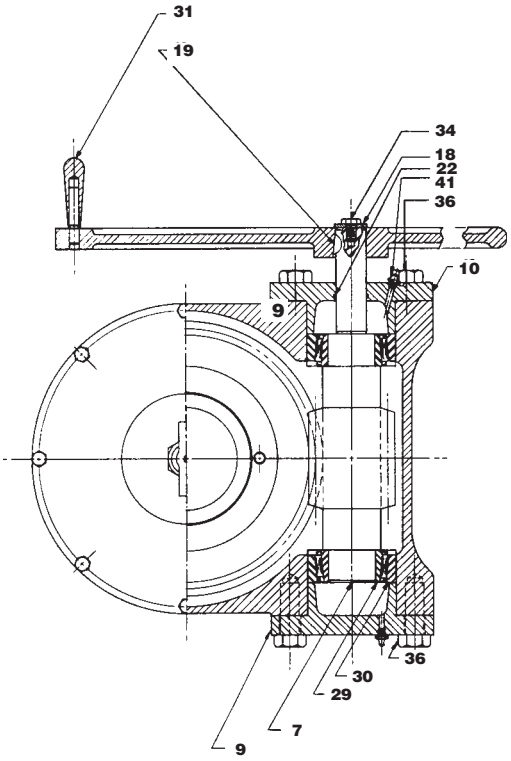
OPERATOR ASSEMBLY

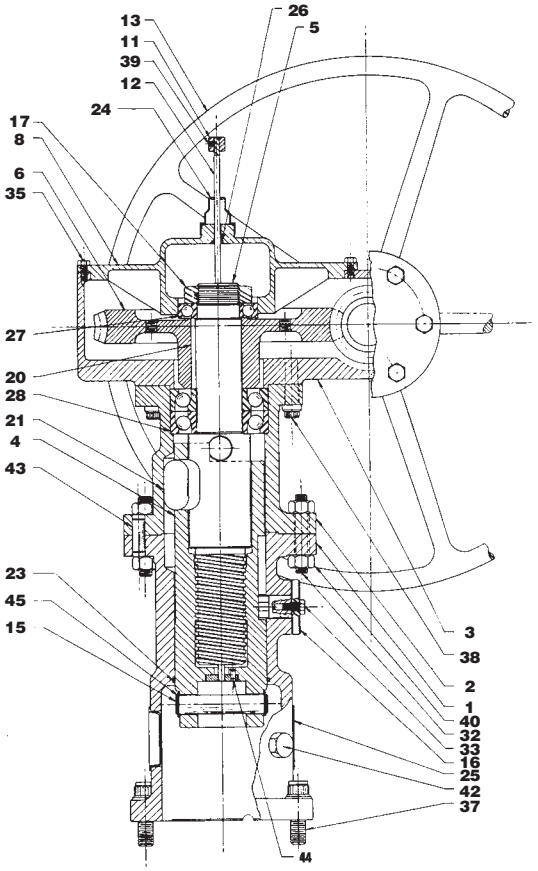
1. Install the two bearings (26) at top of upper stem (3). **NOTE:** These are radial thrust bearings and must be installed such that the widest surfaces of the inner raceways are back to back. ***INCORRECT INSTALLATION WILL RESULT IN SERIOUS DAMAGE.***
2. Install the bearing retaining ring (40).
3. Apply a liberal coating of grease to all surfaces of the upper stem (3).
4. Thread the upper stem (3) into the lower stem (4) such that the drive pin in the upper stem comes against the shoulder at the TOP of the lower stem and the detent recess in the upper stem is exactly in line with the roller opening in the lower stem. This operation may require several attempts as the threads are multiple start.
5. Install the indicator shaft sub-assembly (10) up through both stems.
6. Install O-ring (21) in housing (1).
7. Place the roller (48) in the side opening of the lower stem (4).
8. Place the stem assembly into the housing (1) taking care that the roller (48) is aligned with the roller groove in the housing. Push the assembly down until the lower bearing (26) rests on the shoulder in the housing.
9. Apply a smooth even coating of Permatex Form-A-Gasket to the surface of the guide pin boss on the housing (1).
10. Insert the guide pin (13) to full engage the slot in the lower stem (4) and fasten with cap screws (32).
11. Place gear key (18) in keyway of upper stem (3).
12. Install tapered roller bearing cup (28) in rear bearing recess of gear housing (2) with large diameter of taper facing out.
13. Install tapered roller bearing cup (28) and cone (27) on handwheel end of worm shaft (6).
14. Install worm shaft (6) in gear housing (2). Make certain that rear bearing cone (27) has properly entered the rear bearing cup (28).
15. Install O-ring (20) in bearing cap (8).
16. Apply a smooth coating of Permatex Form-A-Gasket to bearing cap boss on gear housing (2). Fasten bearing cap in place with cap screws (30). Be sure to install the plastic shims between the gear housing and the bearing cap.
17. Install worm gear (6) in gear housing (2) hub down (toward smallest opening).
18. Place the gear housing (2) with assembled parts on top of the operator housing guiding the worm gear keyway over key (18) in upper stem (3).
19. Install the ball bearing (25) on the upper stem (3) and secure with nut (15).
20. Apply a smooth coating of Permatex Form-A-Gasket to top of operator housing.
21. Fasten the gear housing (2) to the operator housing with cap screws (35 and 3). ***CAUTION: NOTE THAT THE SHORT CAP SCREW (72B) IS INSTALLED DIRECTLY UNDER THE CENTER OF THE WORM.***
22. Fill the gear housing (2) with grease up to the top of the worm gear (5).
23. Apply a smooth coating of Permatex Form-A-Gasket to top surface of gear housing (2).
24. Install grease seal (24) in gear housing cover (7). Slide cover over indicator shaft (10) and ball bearing (25) and secure to top of operator housing with cap screws (33).
25. Install the indicator shaft protector (22).
26. Install the indicator flag (9) and secure with screw (37).
27. Install handwheel (11) with woodruff key (17), washer (16) and cap screw (34).

Item No.	1261 G Part No.	1261 7G Part No.	Description	Item No.
1	21-621	21-621	Operator Housing	1
2	21-518	21-518	Gear Housing	1
3	22-552	22-552	Upper Stem	1
4	22-553	22-553	Lower Stem	1
5	23-472	23-472	Worm Gear	1
6	24-428	24-428	Worm Shaft	1
7	26-513	26-513	Gear Housing Cover	1
8	26-514	26-514	Bearing Cap	1
9	27-406	27-406	Indicator Flag	1
10	27-488	27-488	Indicator Shaft	1
11	28-402	28-402	Handwheel	1
12	41-402	41-402	Drive Pin*	1
13	41-496	41-496	Guide Pin	1
14	41-411	41-411	Coupling Pin	1
15	42-403	42-403	Nut	1
16	44-401	44-401	Handwheel Washer	1
17	45-402	45-402	Woodruff Key	1
18	45-404	45-404	Key	1
19	48-412	48-412	Roller	1
20	62-13	62-13	O-Ring	1
21	62-208	62-208	O-Ring	1
22	64-411	64-411	Protector	1
23	64-416	64-416	Plastic Plug	21
24	65-401	65-401	Grease Seal	1
25	66-404	66-404	Ball Bearing	2
26	66-411	66-411	Ball Bearing	2
27	66-465	66-465	Bearing Cone	2
28	66-466	66-466	Bearing Cup	1
29	69-414	69-414	Spinner Handle	4
30	72-2	72-2	Cap Screw	1
31	72-3	72-3	Cap Screw	2
32	72-4	72-4	Cap Screw	8
33	72-7	72-7	Cap Screw	1
34	72-8	72-8	Cap Screw	7
35	72-13	72-13	Cap Screw	2
36	72-21	72-21	Cap Screw	1
37	73-28	74-6	Screw	1
38	73-28	74-12	Set Screw	2
39	76-412	76-412	Lube Fitting	1
40	78-405	78-405	Retaining Ring	2
41	78-407	78-407	Retaining Ring	1
42	93-413	93-413	Cover	1
43	——	26-712	Adapter	1

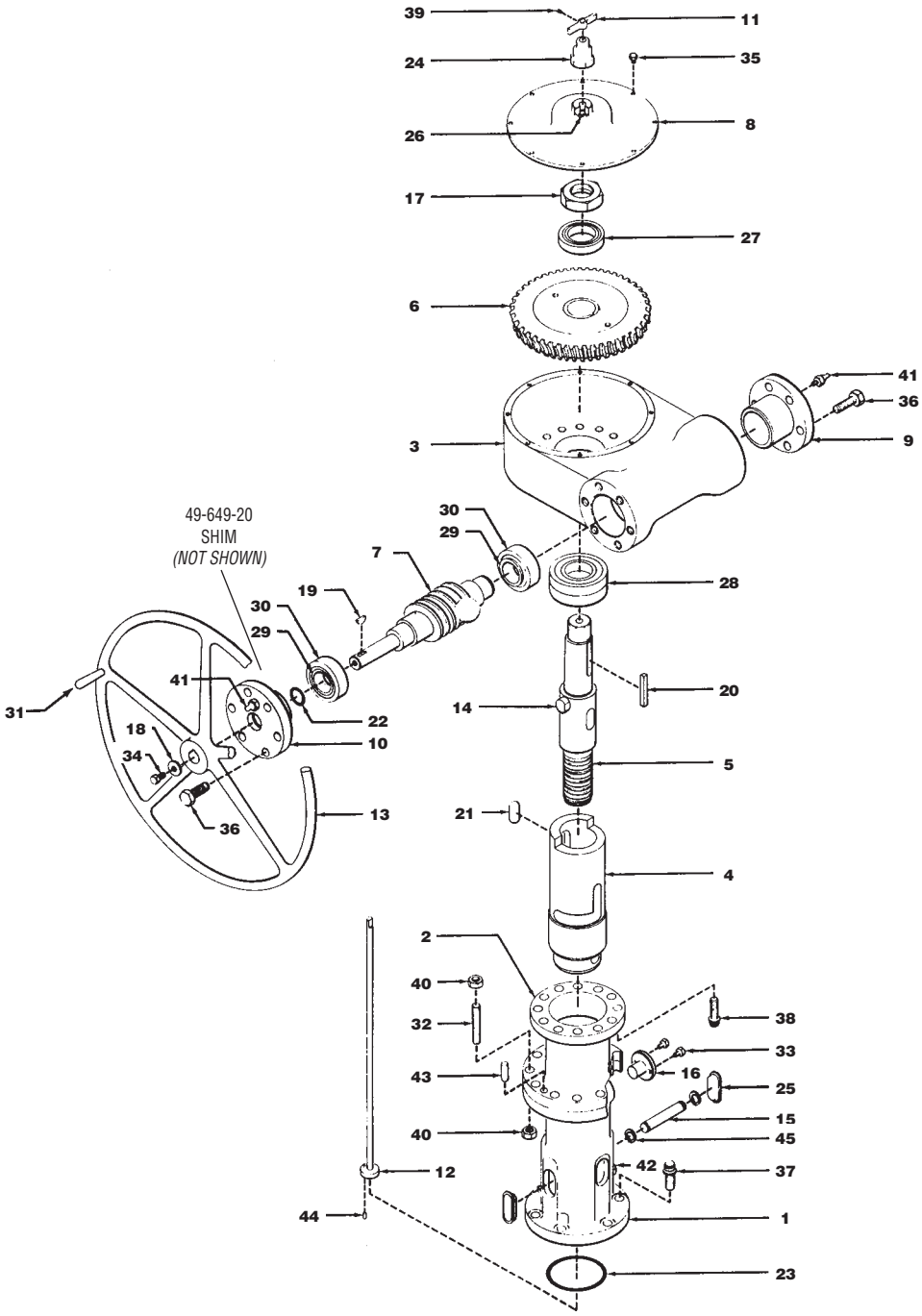
* not available separately

Cross Section





Exploded View



1276 G Is Used on Models:			
10"	C851	16"	C921
16"	CA841	20"	CB921
20"	CA821		
24"	CA821		
30"	CC811		

OPERATOR DISASSEMBLY

1. Turn handwheel counter clockwise to full open position.
2. Remove set-screw (39) and indicator flag (11).
3. Remove the stem protector (24).
4. Unbolt and remove the gear housing cover (8).
5. Remove the bearing retainer nut (17) and ball bearing (27).
6. Remove cap screw (34), washer (18), handwheel (13) and key (19).
7. Unbolt and remove the bearing caps (9) and (10). ***CAUTION: DO NOT DAMAGE THE PLASTIC SHIMS UNDER FRONT BEARING CAP (10).***
8. Remove worm shaft (7) and taper bearings consisting of cone (29) and cup (30).
9. Remove worm gear (6) and key (20).
10. Unbolt and remove the gear housing (3).
11. Unbolt and remove the guide pin (16).
12. Pull the upper stem (5) and lower stem (4) with bearings (28) and roller (21) out through the top of the upper housing (2). If bearings are snug in the upper housing, remove the upper and lower stems with the roller through the bottom of the lower housing (1). Unbolt the upper and lower housing and remove the bearings with a suitable puller.
13. Separate the upper and lower stems and remove indicator shaft assembly (12).

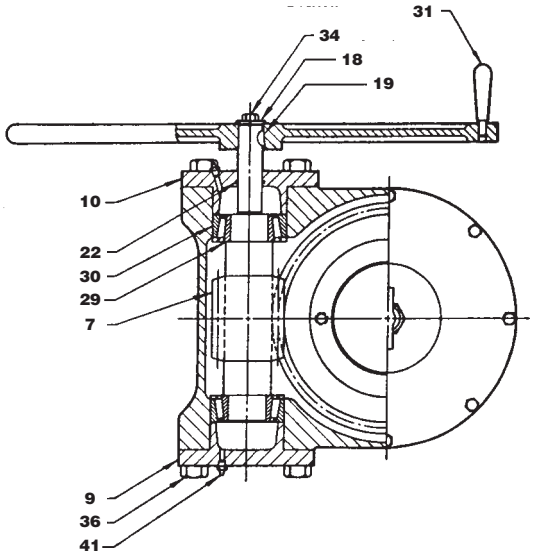
OPERATOR ASSEMBLY

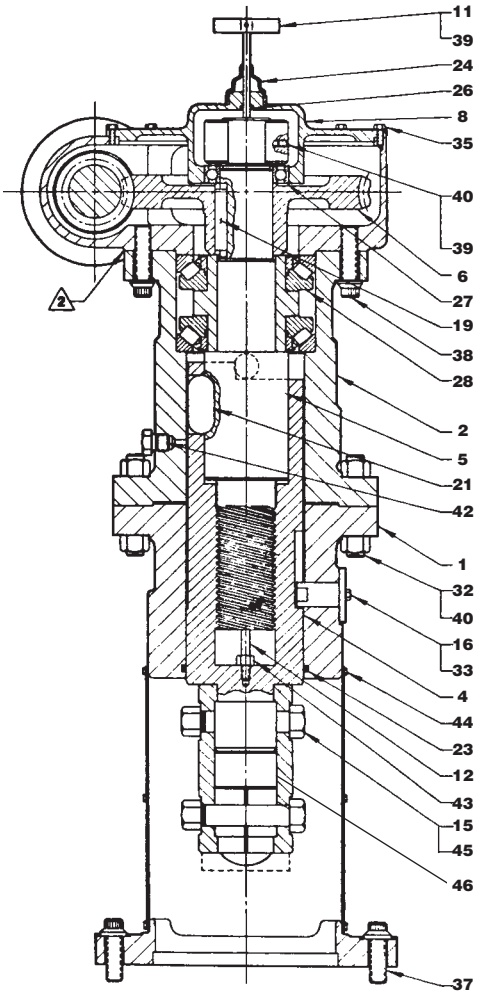
1. Install the two bearings (28) at the top end of the upper stem (5). NOTE: These are radial thrust bearings and must be installed such that the widest surfaces of the inner race ways are back to back. ***INCORRECT INSTALLATION WILL RESULT IN SERIOUS DAMAGE.***
2. Apply a smooth even coating of Permatex Number 3D to the bottom flange of the upper housing (2) and fasten to the lower housing (1) with studs (32) and nuts (40). The dowel pin (43) is a press fit in the lower housing and a slip fit in the upper housing. Its function is to properly align the roller grooves.
3. Apply a liberal coating of grease to all surfaces of upper stem (5) and lower stem (4).
4. Thread the two stems together such that the drive pin (14) in the upper stem comes against the shoulder at the top of the lower stem and the detent recess in the upper stem is exactly in line with the roller opening in the lower stem. This operation may require several attempts as the threads are multiple start and do not always assemble correctly with the first try.
5. Install the indicator shaft sub-assembly up through both stems and secure with the roll pin (44) in the bottom of the lower stem.
6. Install O-ring (23) in the lower housing (1).
7. Place the roller (21) in the side opening of the lower stem (4). A liberal application of grease will hold it in place.
8. Place the stems with bearings and roller assembled down through the top of the upper housing until the lower of the two bearings (28) rests on the shoulder in the upper housing.
9. Apply a smooth even coating of Permatex Form-a-Gasket to the surface of the guide pin boss on the lower housing (1).
10. Insert the guide pin (16) to fully engage the slot in the lower stem and fasten with cap screws (33).
11. Place the gear key (20) in the keyway of the upper stem (5).
12. Place the tapered roller bearing cones (29) on each end of the worm shaft (7) with the large diameter of the cone taper against each shaft shoulder.
13. Assemble the cups (30) on the cones (29).
14. Apply a smooth even coating of Permatex Number 3D to the surfaces of the bearing retainer bosses on the gear housing (3).
15. Fasten the blind bearing cap (9) in place with cap screws (36).
16. Install the worm shaft (7) in the gear housing.
17. Install the O-Ring (22) in the bearing cap (10) and fasten in place with cap screws (36). Be sure to re-install the plastic shims between the gear housing and the bearing cap.
18. Install worm gear (6) in gear housing with hub down. (Toward smallest opening).
19. Apply a smooth coating of Permatex Number 3D to top flange of upper housing.
20. Place the gear housing with assembled parts on top of the upper housing guiding the worm gear keyway over the key (20) in the upper stem, and fasten to the upper housing with cap screws (38).
21. Install ball bearing (27) over upper stem and secure with nut (17).
22. Fill the gear housing with grease up to the top of the worm gear.
23. Apply a smooth even coating of Permatex Number 3D around top surface of gear housing.
24. Install the grease seal (26) in the gear housing cover (8). Slide the cover over the indicator shaft (12) and the ball bearing (27) and secure to the top of the operator housing with cap screws (35).
25. Install the stem protector (24) and secure the indicator flag (11) in place with set screw (39).
26. Install the handwheel (13) with key (19), washer (18), cap screw (34) and spinner handle (31).

Item No.	1276 G Part No.	Description	Req'd
1	21-594	Lower Housing	1
2	21-595	Upper Housing	1
3	21-505	Gear Housing	1
4	22-533	Lower Stem	1
5	22-534	Upper Stem	1
6	23-461	Worm Gear	1
7	24-425	Worm Shaft	1
8	26-487	Gear Housing Cover	1
9	26-488	Bearing Cap	1
10	26-489	Bearing Cap	1
11	27-406	Indicator Flag	1
12	27-541	Indicator Shaft	1
13	28-432	Handwheel	1
14	41-473	Drive Pin*	1
15	41-476	Coupling Pin	1
16	41-480	Guide Pin	1
17	42-403	Nut	1
18	44-401	Washer	1
19	45-402	Key	1
20	45-428	Key	1
21	48-409	Roller	1
22	62-20	O-Ring	1
23	62-215	O-Ring	1
24	64-412	Protector	1
25	64-416	Plastic Plug	4
26	65-401	Grease Seal	1
27	66-404	Ball Bearing	1
28	66-452	Ball Bearing	2
29	66-454	Bearing Cone	2
30	66-463	Bearing Cup	2
31	69-414	Spinner Handle	1
32	71-47	Stud	12
33	72-5	Cap Screw	2
34	72-8	Cap Screw	1
35	72-26	Cap Screw	8
36	72-64	Cap Screw	12
37	73-111	Cap Screw	6
38	73-131	Cap Screw	12
39	74-6	Screw	1
40	75-406	Nut	24
41	76-412	Lube Fitting	2
42	76-536	Pipe Plug	1
43	77-454	Dowel Pin	1
44	77-481	Rollpin	1
45	78-407	Retaining Ring	2

* not available separately

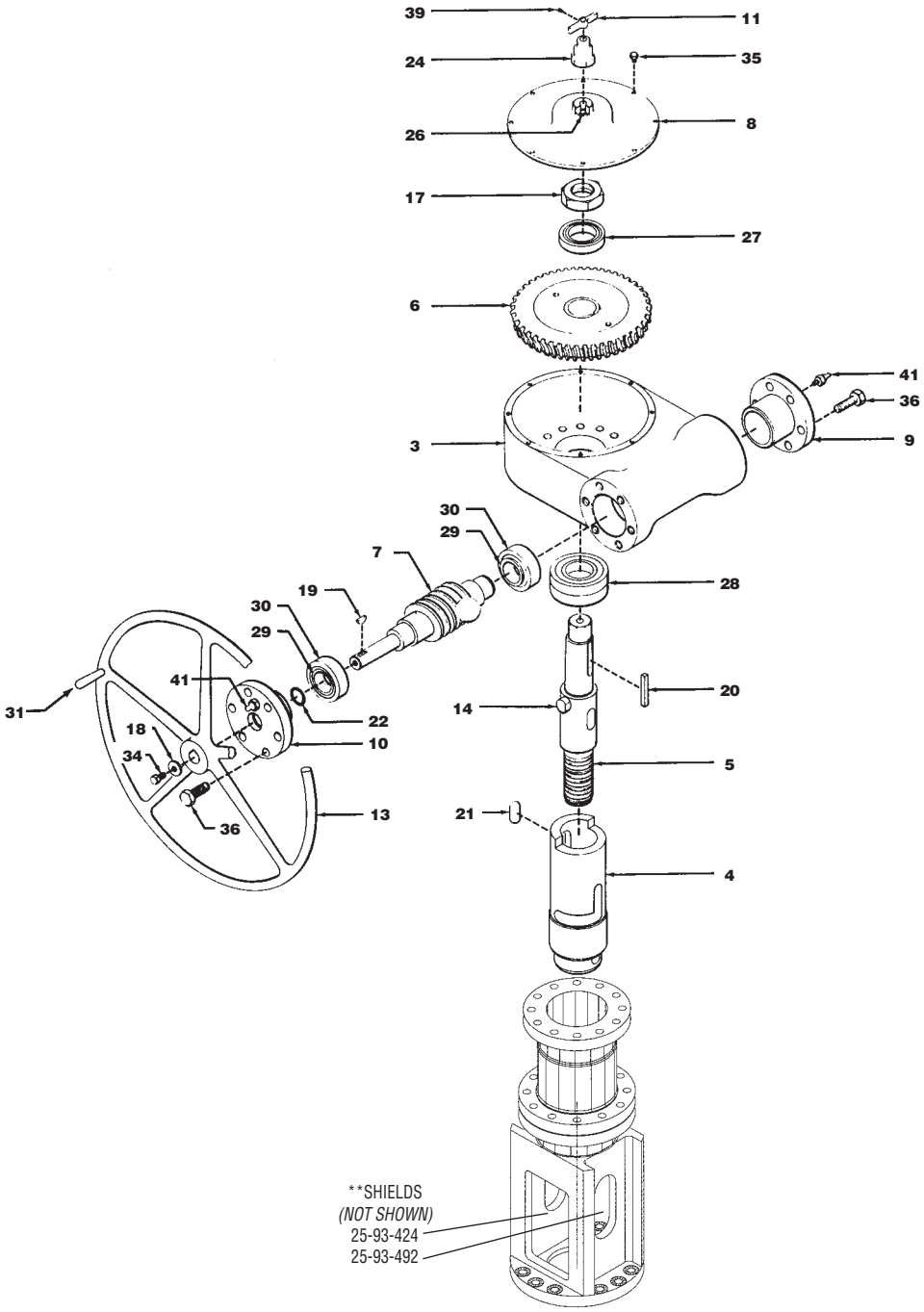
Cross Section





Handwheel not shown

Exploded View



1500 G Is Used on Models:			
20"	C841	16"	C941
30"	CC821		
36"	CA811		

OPERATOR DISASSEMBLY

1. Turn worm shaft counter-clockwise to full open position.
2. Remove set screw (39) and indicator flag (11)
3. Remove the stem protector (24).
4. Unbolt and remove the gear housing cover (8).
5. Remove the set screw (39), and upper stem nut (17).
6. Remove the ball bearing (27).
7. Unbolt and remove bearing cap (10). CAUTION: DO NOT DAMAGE THE PLASTIC SHIMS UNDER MOTOR ADAPTER.
8. Remove the worm shaft (7) and taper bearings consisting of cones (29) and cups (30).
9. Remove worm gear (6) and key (20).
10. Unbolt and remove the gear housing (3).
11. Unbolt and remove the guide pin (16).
12. Pull the upper stem (5) and lower stem (4) with bearings (28), bearing retainer and roller (21) out through the top of the upper housing (2). If bearings are snug in the upper housing, remove the upper and lower stems with the roller through the bottom of the lower housing. Unbolt the upper and lower housings and remove the bearings with a suitable puller.
13. Separate the upper and lower stems and remove the nut (43) and indicator shaft (12).

OPERATOR ASSEMBLY

1. Install the two bearings (28) and bearing retainer at the top end of the upper stem (5). NOTE: These are radial thrust bearings and must be installed such that the widest surfaces of the inner raceways are back to back. INCORRECT INSTALLATION WILL RESULT IN SERIOUS DAMAGE.
2. Apply a smooth even coating of Form-A-Gasket to the bottom flange of the upper housing (2) and fasten to the lower housing (1) with studs (32) and nuts (40).
3. Apply a liberal coating of grease to all surfaces of the upper stem (5) and lower stem (4).
4. Thread the two stems together such that the drive pin in the upper stem comes against the shoulder at the top of the lower stem and the detent recess in the upper stem is exactly in line with the roller opening in the lower stem. This operation may require several attempts as the threads are multiple start and do not always assemble correctly with the first try.
5. Install the indicator shaft (12) up through both stems and secure with nut (43) in the bottom of the lower stem.
6. Install 0-ring (23) in the lower housing.
7. Place the roller (21) in the side opening of the lower stem (4). A liberal application of grease will hold it in place.
8. Place the stems with bearings (28), bearing retainer and roller (21) assembled down through the top of the upper housing until the lower of the two bearings rests on the shoulder in the upper housing.
9. Apply a smooth even coating of Form-A-Gasket to the surface of the guide pin boss on the lower housing.
10. Insert the guide pin (16) to fully engage the slot in the lower stem and fasten with cap screws (33).
11. Place the gear key (20) in the keyway of the upper stem.
12. Place the tapered roller bearing cones (29) on each end of the worm shaft (7) with the large diameter of the cone taper against each shaft shoulder.
13. Assemble the cups (30) on the cones.
14. Install the worm shaft in the gear housing.
15. Apply a smooth even coating of Form-A-Gasket to motor adapter mounting surface of the gear housing.
16. Install o-ring (22) in the bearing cap (10) and fasten to gear housing with screws (36). Be sure to re-install the plastic shims between the gear housing and motor adapter.
17. Install worm gear (6) in gear housing with hub down (toward smaller opening).
18. Apply a smooth even coating of Form-A-Gasket to the top flange of the upper housing.
19. Place the gear housing with assembled parts on top of the upper housing guiding the worm gear keyway over the key (20) in the upper stem and fasten to the upper housing with cap screws (38).
20. Install ball bearing (27) over upper stem and secure with upper stem nut.
21. Install insert and set screw into upper stem nut.
22. Fill the gear housing with grease up to the top of the worm gear.
23. Apply a smooth even coating of Form-A-Gasket around top surface of the gear housing.
24. Install the grease seal (26) in the gear housing cover (8). Slide the cover over the indicator shaft (12) and ball bearing (27) and secure to the top of the gear housing with cap screws (35).
25. Install stem protector (24) and secure indicator flag (11) in place with set screw (39).

Item No.	1500 G Part No.	Description	Req'd
1	21-572	Lower Housing	1
2	21-571	Upper Housing	1
3	21-573	Gear Housing	1
4	22-510	Lower Stem	1
5	22-509	Upper Stem	1
6	23-411	Worm Gear	1
7	24-425	Worm Shaft	1
8	26-515	Gear Housing Cover	1
9	26-488	Bearing Cap	1
10	26-489	Bearing Cap	1
11	27-406	Indicator Flag	1
12	27-450	Indicator Shaft	1
13	28-432	Handwheel	1
14	41-474	Drive Pin*.	1
15	32-410	Coupling Pin	1
16	41-474	Guide Pin	1
17	75-441	Nut	1
18	44-401	Washer	1
19	45-402	Key	1
20	45-414	Key	1
21	48-408	Roller	1
22	62-20	O-Ring	1
23	62-89	O-Ring	1
24	64-412	Protector	1
25	**	Oper. Shield	2
26	65-401	Grease Seal	1
27	66-424	Ball Bearing	1
28	66-425	Ball Bearing	1
29	66-454	Bearing Cone	2
30	66-463	Bearing Cup	2
31	69-414	Spinner Handle	1
32	71-109	Stud	12
33	72-5	Cap Screw	2
34	72-8	Cap Screw	1
35	72-26	Cap Screw	8
36	72-64	Cap Screw	12
37	73-87	Cap Screw	12
38	73-124	Cap Screw	12
39	74-6	Screw	1
40	75-408	Nut	24
41	76-412	Lube Fitting	2
42	76-470	Pipe Plug	1
43	75-441	Nut	1
44	72-21	Capscrew	30
45	75-442	Coupling Pin Nut	2
46	32-452	Spacer	1

* not available separately

UNDERSTANDING THE DTR BLEED SYSTEM

SCOPE

This specification addresses the proper functioning, trouble shooting, and repair of the General Twin Seal differential (pressure) thermal relief (DTR) bleed system.

BACKGROUND

When the General Twin Seal valve is seated and completely filled with a liquid, any slight variation in temperature due to the sun's rays or ambient thermal fluctuations will cause drastic changes in body cavity pressure resulting from thermal expansion.

Valves filled with 330 API fuel oil have exhibited a 75 PSI increase in pressure with a temperature rise of only 1° F. Putting this into perspective, a normal daily 30°F swing in ambient temperature may cause an increase of body cavity pressure of 2250 PSI.

While results vary under actual service conditions depending on media, pressure vessel rigidity, and presence of entraned gas it is known that dangerously high pressures will build up in liquid filled positive shut off valves.

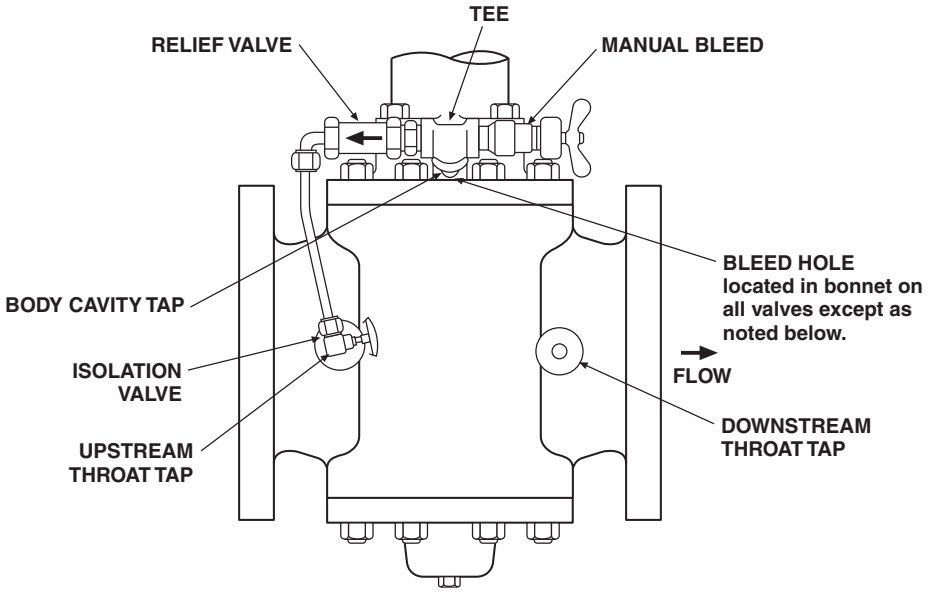
Therefore, the General Twin Seal in liquid service requires a pressure relief device.

The differential (pressure) thermal relief (DTR) system is one such automatic "device" and should be included on every automated valve.

HOW IT WORKS

The differential (pressure) thermal relief (DTR) system is arranged as shown below. A variety of components are used in the DTR. As shown here, one can see that the relief valve mounted at the tee outlet on the bonnet pipes over pressure to upstream throat of the valve. The standard relief valve is set to open at 25 PSI on all valves regardless of working pressure. With the valve closed, the relief valve will open at 25 PSI above upstream pressure. This system functions only when the valve is closed.

A manual body bleed valve is included on the General Twin Seal as standard. This bleed valve installed in the relief system is opened after the Twin Seal is closed. Seal effectiveness can be immediately evaluated, after allowing a few seconds for stabilization of cavity volume due to entrained air or gas. The bleed valve must be closed before the Twin Seal is reopened.



Manual bleed with differential thermal relief (DTR) system discharged to flow line

An isolation valve installed in the upstream throat tap is also included on the standard DTR. It must be left open to permit relief system to relieve pressure upstream.

The isolation valve will be used only for maintenance and trouble shooting which will be explained later.

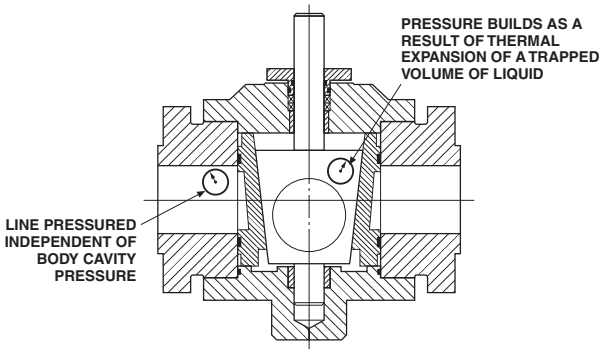
Valve is to be CLOSED ONLY FOR REPAIR. If closed during normal operation the automatic portion of the relief system (relief/check valve) will be defeated. (The outlet of the relief valve would close when closing the isolation valve).

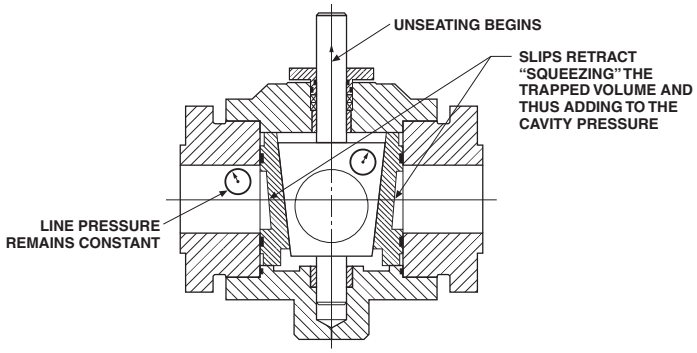
The remaining components of the bleed system i.e., tube fittings, nipples, pipe fittings etc., are not functionally involved in "how it works" but may be involved in "why it doesn't work" which will be discussed later.

WHY IT IS ESPECIALLY IMPORTANT ON MOTOR OPERATED VALVES

Electrically powered actuators or motor operators are configured normally to bypass or ignore the opening torque limiter as the valve just begins unseating.

If the motor operated General Twin Seal has experienced any thermal expansion the pressure in the body cavity may have increased significantly above line pressure (see figure below) which would hydrostatically cause unseat load resistance. Worse yet, as these slips are pulled inwardly by the ascending plug the trapped body cavity volume is squeezed like an accordion.

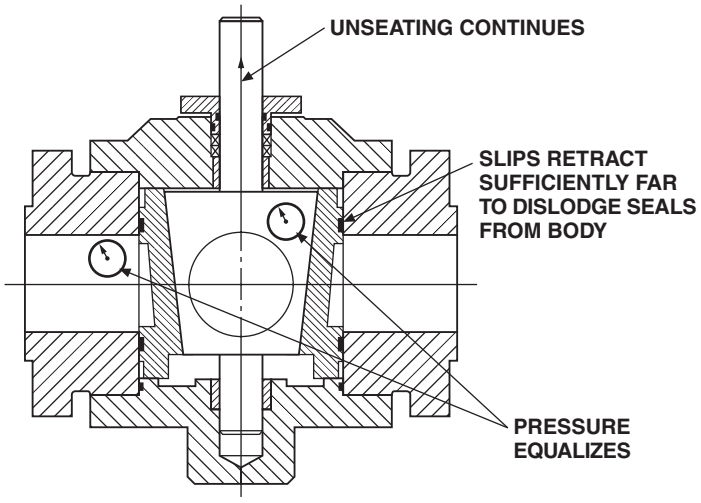

PRESSURE BUILDS AS A RESULT OF THERMAL EXPANSION OF A TRAPPED VOLUME OF LIQUID
LINE PRESSURED INDEPENDENT OF BODY CAVITY PRESSURE


UNSEATING BEGINS
SLIPS RETRACT "SQUEEZING" THE TRAPPED VOLUME AND THUS ADDING TO THE CAVITY PRESSURE
LINE PRESSURE REMAINS CONSTANT

This pumps the body cavity pressure even higher adding directly to the thermal expansion pressure until something gives, such as...

1) The slip seals retract or
2) The motor stalls or
3) Something breaks or
4) The DTR relieves

Since our slip seals are so dependably bubble tight and motor stall may be as high as 6 times maximum rated torque (remember the torque limiter is out of the unseat circuit) we see that electric motor operators MUST have AUTOMATIC pressure protection which is, as shown previously, exactly what the DTR does best. Torque switch settings on electric actuators should be set higher on the opening direction than the closing direction.l



CONCERNS OF OTHER TYPES OF ACTUATORS

Other remotely power operated valves, i.e. hydraulic, pneumatic, DC, etc., may display stall problems during unseat if no automatic pressure protection (DTR) is installed, therefore DTR is required in these applications also. But stall torque does not represent same damaging concern.

MANUALLY OPERATED VALVES

Manually operated valves (operated locally) allow access to their manual body bleed valves which may be vented slightly to relieve this pumping action as well as thermal build up. If this center cavity cannot be vented to the atmosphere for environmental or safety reasons, the DTR may be required. Optionally, a manual body bleed alone may be acceptable.

Symptom	Problem	Solution
Valve stalls as it unseats	Isolation valve closed Relief check valve installed backwards	Open isolation valve - close only to repair Close isolation valve seat valve bleed and drain valve remove check/reliet reverse reinstall close bleed open isolation valve
Tubing/piping leaking	Check valve plugged foreign material Loose fittings/nipple damaged bleed	Same as above but replace or clean Close isolation valve close valve bleed and drain valve, repair as required open isolation valve close bleed

In order to check that your bleed system is properly working, install or observe a proper pressure gauge upstream of the valve. Seat the General Twin SealTM, verify integrity. Hook up a hand pump with ~ proper pressure gauging to the manual body bleed. With the hand pump reservoir full of compatible fluid open MBV, begin pumping slowly observing body cavity pressure. Note it should not exceed upstream pressure by more than 25 PSI. If this is so, the DTR relief has been verified.

OPERATION

The General Twin Seal Valve is a non-lubricated, resilient seal, plug-type valve which has a mechanical means of freeing the plug before it is rotated from the closed to the open position. In opening the valve, the plug is raised, thus retracting the seating segments or slips through their tapered dovetail connections. Only after the slips are fully retracted perpendicularly from the body seat is the plug rotated to the open position.

Conversely, in closing the valve, the plug and slips are rotated freely, with no seal-to-body contact, until the slips are positioned over the ports. Then the plug is driven down between the slips and the tapered surfaces wedge out the slips for a positive upstream as well as downstream shut-off. For maximum upstream sealing, ***Do not back off. Do not use cheaters.***

The small Twin Seal Valves are handwheel operated, and require up to 3 turns to open or close. Up to $2\frac{3}{4}$ turns expand or retract the slips, while $\frac{1}{4}$ turn rotates the plug. Large valves operate in a similar manner, except that they have enclosed weather-proof worm gearing.

At the top of the valve, a position indicator flag shows the exact plug position. It appears in line with the flow when the valve is open, and perpendicular to the flow when the valve is closed.

Since Twin Seal valves hold bubble-tight, for ease of opening in liquid service, it is important to prevent trapped body pressure from exceeding the working pressure of the valve. Therefore, a relief system is required to prevent pressure buildup in the body cavity.

HANDWHEEL REPOSITIONING

On gear-operated models the handwheel position may be changed as follows:

A) Place valve in full open position. **B)** Remove gear housing cap screws. **C)** Turn handwheel to further **open** the valve–this will turn gear housing. Continue until handwheel comes to desired position and gear housing mounting holes are aligned. **D)** Replace gear housing mounting cap screws. ***Be sure short cap screw is inserted below worm shaft.***

MAINTENANCE

The Twin Seal Valve requires no day-to-day maintenance, however, there are some services which may be needed occasionally.

1. Annually, drain plugs in the lower plate should be removed and the residue flushed and drained from the lower plate. In cold climates, before freezing weather sets in, any possible collection of water below valve plug or plug trunnion should be drained out through the lower plate drain plugs.

a. Keep the valve operator housing full of lubricant to displace and prevent moisture from accumulating and freezing. The operator is provided with a grease fitting. Lubricant should be injected with the Twin Seal Valve in the **open** position only. Under ordinary conditions, a few pumps of the grease gun semi-annually is sufficient. Use lithium 12 hydroxy stearate or lithium base molydisulfide grease.

b. If applicable, temporarily remove ABBV cover and guide pin. Liberally apply grease in this area semi-annually.

2. If at any time the body bleed should indicate a leak which cannot be stopped with ordinary force on handwheel **(no cheaters necessary)**, this may be corrected by one of the following:

a) Operate valve through open-close cycle while fluid is flowing to flush out valve body. After several flushing attempts, close Twin Seal Valve and check body bleed again. If body bleed still indicates valve leakage, proceed to b).

b) If your valve is supplied with a DTR system, it is possible that the relief valve may be leaking. Check this by temporarily closing the line isolation valve. If the leak stops, repair or replace the relief valve. If this is not the case, the slips need inspection.

c) To inspect or replace slips **the line must be drained.** Then place Twin Seal valve in open position (check body bleed valve for zero line pressure) and remove lower plate (lower plate can be driven off by closing valve, inserting a wedge and then opening valve again). Slips can be removed from plug and inspected or replaced if damaged. Be sure to save the old slips and return to General Valve Company for exchange credit. It is recommended to replace the lower plate O-ring and gasket any time the lower plate is removed and slips are replaced.

If lower plate is not accessible for replacing seating slips, the valve operator and bonnet can be removed (Check body bleed for zero line pressure before removing bonnet) and slips replaced from the top of the valve.

3. If stem packing needs replacement, it can be changed as follows:
- **a)** Remove operator as described in #4 below.
- **b)** Remove packing gland and replace inner and outer O-rings and backup ring.
- **c)** Remove packing rings and replace carefully.
- **d)** Replace packing gland.
- **e)** Replace operator as described in #4.

4. To change operator:
- **a)** Shut down line pressure.
- **b)** Close Twin Seal Valve extra tightly.
- **c)** Open bleed valve for zero pressure when removing operator.
- **d)** Drive out coupling pin (towards guide pin boss).
- **e)** Remove housing mounting bolts and lift operator off.
- **f)** Replace new operator in reverse order (insert coupling pin from same side as guide pin boss.)
- **g)** Close bleed valve.
- **h)** Check operation of valve.

PARTS

Genuine factory replacement parts are available from General Valve Company, which inventories original equipment parts.

Slips, O-rings and packing are packaged in kits that make ordering simple. Be sure to specify size, series, part number on slip, and type of resilient seal material in your order of replacement slips.

To perform on-site maintenance, a mechanic should keep slip kits and soft good kits on site. Most kits can be shipped from stock, typically within 48 hours after receipt of order.

General Valve Company also offers major valve remanufacturing, emergency repairs, money-saving reconditioned slips, technical assistance by phone, maintenance contracts, startup service and service training seminars.

General Valve Company

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